

MEETING NOTES - JUNE 22ND, 1986

The June meeting of LIST group was called to order at 2:15PM. There have been no new members since the last meeting, but two old members, who had been dropped from the rolls, renewed. There were 18 members and one guest present for this meeting. Paul D. apologized for incorrectly listing the June meeting date. We hope not too many people show up on the 29th.

OLD BUSINESS

Paul D. noted that since Izzie G. was leaving for Florida (permanently), a new newsletter editor would be required for the October issue. This Mega issue will cover the group until then. Some editorial material is already on hand. No one present volunteered for the job. Those not attending are requested to contact Chuck R. or Paul D. if they'd like to edit LISTing.

NEW BUSINESS

Harvey R. suggested we set up a public domain library for the non-copyrighted material on the LIST tapes. This was agreeable, in concept, to the majority of those present. Harvey was requested to submit a formal proposal (costs to run, charges to members (e.g., \$3/tape or so), postage, etc.) at the next meeting.

Harvey also, mentioned that TS mailing lists are available at \$7/1000 names. Using these to promote membership was discussed, but it was felt that the cost might not justify the return.

Stoney McM. wanted to know if the East Coast Computerfest had been firmed up yet. Nobody knew.

PRESENTATIONS

Nazir demoed his Timex Portugal (Zebra) disk drive with CP/M. The system was modified to have 64K on the controller board and boots from a 3" CP/M disk. He believes the formatting is similar to Televideo's and will continue research on finding a 100% compatible 5 1/4" CP/M format. With this, users need only hook up a 5 1/4" drive and start ordering CP/M software from the public domain libraries. Bob G. has Aerco's CP/M. A directory of the supplied programs will be provided next issue.

Peter Ross showed us his "Chromatech" drawing program. An excellent "artist" type program, it will probably be available from Zebra in the near future. Peter also, demoed some BASIC-only Sound generator programs that really put the sound chip on his 2068 through its paces, as he exercised envelopes, channels, decay rates, etc.

John P. demoed "Talking Eliza", an artificial intelligence program from the book "Creative Games for the 2068" which has been enhanced to use the Zebra talker to speak, both input and Eliza's answers. John also, described how he used the channels and streams to run the talker and provided a dissertation on what channels and streams are, how to create them, and how best to make use of them.

Nazir also passed around one of Cedric's "TI'd" keyboards. All were impressed of Cedric's craftsmanship. His outstanding series "Keyboard Mania" concludes in this issue.

NEXT MEETING - Sunday September 14th, 1986 at 2:00PM - Huntington Public Library.

**NEWS
FLASH...**

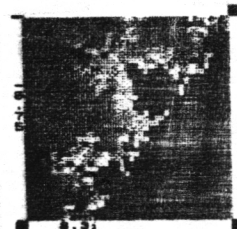
Timex has reached a £50m agreement with an unnamed Polish industrial firm — via its European agent Takis Patrikarakos of Micro Interface — to supply 800,000 Timex 2068 machines and 200,000 FDD 3000 twin 3 1/2 inch floppy disc drives to the Polish government. "

The credibility of Amstrad's deal with Sinclair has been further eroded with news that, far from having "worldwide rights to the Spectrum" as claimed by Amstrad in its announcement to the Stock Exchange on April 7, Portugal and the eastern bloc countries are excluded from the deal. "

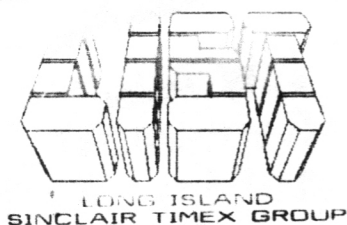
Rights to the Spectrum in these areas are held by Timex. Timex has been manufacturing its 2048 and 2068 Spectrum derivative micros in Portugal since it established a shared technology agreement with Sinclair in 1983. "

Rights to the communist bloc countries passed to Timex shortly before the deal with Amstrad, as part payment for outstanding debts owed to Timex by Sinclair for manufacture of Spectrum micros and flat-screen TVs at Timex's Dundee plant.

And now, only two months after the rights passed to Timex the firm has succeeded where Sinclair demonstrably failed and tied up the biggest ever deal to supply micros to an Iron Curtain country. "



FRAME #
(2, 1, 1)
SIDE
B.0000.0
EXECUTION
HRS 18
MIN 38
SEC 04
THIS FRAME
HRS 18
MIN 38
SEC 04
FILE?



July August
September
1986

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TS COMPUTERFEST VENDORS

Some interesting vendors you may not have heard about:

Smugware Conversions, Box 101, Butler, WI 53007 - Has two books-1) The Timex-Sinclair 2068 ROM Manuscript" by Dr. Lloyd Dreger, reported as a complete, annotated disassembly, with Spectrum Cross references. \$16.95 + \$2.50 S&H → 2) "Introduction to 2068 Machine Code", again by Dr. Dreger - A self-teaching manual - \$16.95 + \$2.50 S&H. Smugware will also convert your programs to AERCO disk for \$4.00. Also has games and other utilities.

Pleasantrees, P.O. Box 2034, Masa, Az 85204 - Pleasantrees isn't new (Paul Bingham, "City of Xon"), but they are now marketing Draw II from ~~Peash~~ Productions; an Icon menu driven "artist" program from Jon Ro_ktenetz, 6333 Parkman Place, Cincinnati, OH 45213.

Finally- There is Bill Bell - 496 Cherrington Rd, Westerville, OH 43081 - Bill sells a universal DOS for TS (ZX-81) computers called BBDOS. Tell him your number of tracks/side, memory allocation and printer specs. Send a SASE.

PD

Making archival copies of your commercial software should be a #1 priority with all TS computer users. It is simply too easy to accidentally damage a cassette tape, and vendor support is virtually nil for many of the available programs.

There are a number of ways of making your legal backup (or "archival") copy. They can be classified into 5 general groups:

- 1) Structuring
- 2) Software "breakers"
- 3) Hardware "snapshot" systems
- 4) Cloning or reproducing
- 5) Direct Duplicating

"Structuring" is a general term we've used to describe an analysis of program structure which results in an understanding of the program sufficient to allow it to be copied. The Hacker Sacker or Codebusters series of articles in L.I.S.T. deal with such methods fairly completely. For those who haven't read these, a few examples of different "structuring" techniques will be given.

The first step in analysing program structure is to look at the program parts, one at a time. This can be done by 'loading' the program under a dummy name. The program won't load, but you'll see the names and types of the various parts. Often all that is required is to Merge the first part of the program, then LOAD the rest and save each part back out to a new tape. Little tricks like using the wrong ink color, embedding false PAPER or INK codes in program lines, POKEing false line #'s or variable values, must each be analyzed and detected.

Often a header reader program is required. This program will tell you not only the names of the various program parts, but their length and location in memory. Once this is known, you can LOAD in the program parts (particularly the CODE), one at a time and then SAVE them back to tape. Finally, there is dissassembly. Here the program parts are loaded in as CODE (perhaps using a simple false header) and analyzed for assembly language meaning, byte-by-byte. This is often required with "turbo" loading programs, as the special "loading" code is hidden in the first part of the program.

Software "breakers" include the LERM suite of programs, 007 SPY, Trans-Express, Clone and RARARI copycat. These programs LOAD into your computer and then instruct you to play the tape to be broken. Some, like LERM, come with comprehensive manual which explains methods of copy protection, structural analysis and breaking techniques for specific program types. Once a program is analysed by LERM, it is loaded into the computer, in parts, and then saved out to your blank tape as a "broken" program. Others, for example Trans-Express, have automatic LOAD-in and SAVE-out routines. This requires less thinking and work on the users part, but limits the range of programs which can be easily broken. 007 SPY is available for the 2068 as well as Spectrum, but most should work on 2068 programs if run on a "Spectrum". One common technique involves trying Trans-express (quick and easy) and, if that fails, then break out the LERM. Software breakers have limited effectiveness against "turbo" or "hyper" loading programs, though most include a "code finder" or monitor segment to help you find the offending tape reading-code. (Turbo loaders are programs which contain their own loading method and do not use the computers ROM routines).

Interface III, Microdrivers, Spec-mate and Multiface-one are hardware systems for "stopping the unstoppable" program. They work by interrupting the program, after it has loaded into the computer, and saving the running program to tape. They work well with almost all software (except some interrupt driven ones, like Avalon) and are particularly useful in defeating elaborate "login and password" type protection schemes (like the color code charts for JSW). The units consist of "black boxes" which plug onto the Spectrum expansion bus. Typically, all a user must do is LOAD in the master program, press a red button on the box to freeze the original program, press a key and start his tape recorder. In a few minutes he has an exact, working copy of the desired program. Similar features are now supplied with the Zebra, Oliger and some other disk systems.

A fourth, and rather unique, method is to "reproduce" the original cassette using your computer and two tape recorders. In this case, a very high speed "sampling" program is loaded into the Spectrum or 2068 and RUN. The tape to be copied is played into the ear socket and passed through the computer's input circuits. It is massaged by the program and sent right back out the MIC port to a waiting second tape recorder. The program is never actually loaded into the computer. This means that even turboloaders can be reproduced, since the cloning technique is independent of the LOAD software in ROM. A program of this type will be included on LIST Library tape 6.X.

Finally, there is "old reliable" hardware duplicating. This is the classic "tape-to-tape" copy. Given a good master and good equipment, almost any tape can be copied in this way. The most sophisticated use of this method is to use commercial high-speed dubbing services (typically <\$10 per copy). Next are the many double-cassette decks now available from Sears, Sanyo and others. These generally cost under \$100 and can be used as part of one's stereo system, as well.

Lower down the spectrum, but still reasonably reliable, is the "Winky Board" type of tape filter and duplicator or the active boards which use an operational amplifier to condition the signal. (Plans for some of these have appeared in LIST).

At the bottom rung, for about \$3, you can buy a simple attenuator patch cord from Radio Shack (50Db) which will match the output [8Ω , 5V(P-to-P)] of one recorder to the input (500Ω , 5MV) of another, and make reasonable tape-to-tape copies.* You must have good recorders, with aligned heads and sufficient frequency response. This method often fails with turboloaders because either the level is too low, or the frequency too high. They are designed to be difficult to copy and it is often difficult to load the original.

Each method has its advantages and weaknesses. The wise choice seems to be to be equipped to attack problem tapes with more than one system. One of the most reliable, for example, is the use of the Hardware Breakers. However, certain software (only Avalon and Rasputin, to my knowledge)** cannot be broken with some of these. A simple answer, which does work, is to make a tape-to-tape copy using an attenuator.

It is absolutely impossible to make a secure TS tape. There must be a BASIC portion of the program, even if it is hidden as CODE. This being the case, those of you who are highly proficient in Z80 machine language, should be able to analyze and break any program. The problem here, of course, is the lack of knowledge or time. Some programs have such obtuse code that even an expert can require weeks to fully decrypt. Still, some programs which resist direct copying may yield easily to a simple disassembler. Code busting, in this way, is good training in the use of machine code. Hot Z is highly recommended, though even a BASIC disassembler will work on most programs.

* In fact, this month (July), you can buy the 40Db attenuator #274-300 at Radio Shack, for \$.99. Use a mini to RCA plug cable.

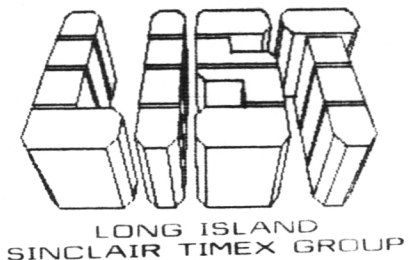
** And 'Way of the Tiger'.

Some Rules of Archiving then are:

- 1) Always make and use a copy, not the original.
- 2) Make 2 copies - each by a different method.
- 3) Store the original in a safe, magnetically neutral, or shielded area.
- 4) Try to make one of your copies an improved version (e.g., for games add some POKES to make it easier for youngsters.)
- 5) Put at least one of your copies on a "group" backup tape. Say a C60, along with others. This saves tape.
- 6) Make sure the write protect tabs are broken off on the original and the copies. (Tape can be used to temporarily reactivate this feature)
- 7) Keep your heads clean.
- 8) Keep magnets (Kitchen magnets, speakers, motors, other appliances) away from your tape.
- 9) Use only good quality tapes. I use Sony CHF60's (\$.68 at F.C. Richards), but any name brand, normal bias, low noise, tape will do.
- 10) Test your copies, preferably on several tape players, to make sure they load reliably.
- 11) Don't mess up your head alignment, just for one tape. Buy a second cheap recorder and play with alignment on that one. Changing head alignment is easy. Getting it back where it started from is not.
- 12) Experiment. Try different techniques, both hardware and software. Try two pieces of hardware at the same time.
- 13) Read and study. Go to the local library and take out books on computers (001.6X) and electronics (638.XX) and study tape drive, circuits, techniques, audio principles, etc.

No study on backups would be complete if we didn't mention bad tapes. Occasionally, you will receive a tape which is so poorly recorded that it either won't load or loads only occasionally. For these, you must either send it back immediately, or try to improve the quality of the signal reaching your computer.

One of the simplest, and least expensive, ways to do this is to purchase Radio Shacks \$12 portable audio amplifier. Many readers have told us that this is often just the ticket for increasing the gain enough to assure loading. Winky boards and Op Amp circuits are often helpful, as well, and of course, the family stereo (particularly if one channel is weak) is often put to good use here.



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* These even work on my high speed ADAM digital data drive, after minor modifications.

KEYBOARD MANIA - Part 6

By Cedric R. Bastiaans©

Page A

XI. MODIFYING THE SE-JIN TI KEYBOARD

XII.1 PREAMBLE

Before I start with the instructions for modification of the TI-99/4A keyboard, as made by SE-JIN in Korea, I would like to state that, in order to preserve space in this News Letter, I can not and will not repeat any and all observations, previously made for the KB made by ALPS in Japan, as they may relate to the SE-JIN KB.

YOU SHOULD THEREFORE READ THE FOLLOWING INSTRUCTIONS IN CONJUNCTION WITH PARTS 3 AND 4, as well as Note 1 of Part 5!

XII.2 CUTTING THE TRACES

Make the following 29 cuts. Be VERY CAREFUL; this PCB has very poor keyswitch identification. There are no numbers to refer to, only abbreviated keytop references and these are not consistently placed. Sometimes they are between a contact-pair (as they indeed should be), other times you'll find them either to the left or to the right of such a pair. It is VERY EASY TO MAKE MISTAKES! Check and double check, before you make a cut. I found myself constantly checking the wanted spot by counting each contact-pair either from the extreme left or the extreme right.

"LEFT" and "RIGHT" refer to the location of solderpads of a given pair of keyswitch contacts.

On Switch "=", cut ALL 3 traces.

On Switch "/", cut LOWER trace to LEFT pad and the trace to the RIGHT pad.

On Switch "ENT", cut trace to the RIGHT pad.

On Switch ";", cut ALL 3 traces, but cut the one to the RIGHT pad very close to it, so that the dog-legged trace from the LEFT pad of adjacent Switch "L" remains in tact!

On Switch "FCTN", cut the trace between LEFT pad and switch "SH" above it.

On Switch ">", cut BOTH traces to the RIGHT pad.

On Switch "<", cut BOTH traces to the LEFT pad.

On Switch "M", cut the trace to the RIGHT pad.

On Switch "N", cut BOTH traces to the RIGHT pad.

On Switch "SP", cut the trace to the RIGHT pad.

On Switch "B", cut trace to the RIGHT pad.

On Switch "V", cut the trace to the LEFT pad.

On Switch "C", cut the trace leading away to the right from the RIGHT pad.

On Switch "X", cut trace leading away to the right from the LEFT pad.

On Switch "Z", cut UPPER trace to the RIGHT pad.

On Switch "CTL", cut the trace to the RIGHT pad.

On Switch "AL", cut ALL 3 traces.

On Switch "SH" on the RIGHT SIDE of the PCB (directly above the "AL" switch), cut the trace to the LEFT pad and the UPPER trace to the RIGHT pad.

XII.3 PUTTING IN THE JUMPERS

In the following, we will also assume that the Alpha Lock key will become a dedicated "*" key. All other available extra keys are for the same dedicated functions as described for the ALPS KB, i.e. ", " . " ; " : " and "DELETE".

Furthermore, we will sometimes use the solderpads of the straps, which are on the other (not visible) side of the PCB. These straps run, with a few exceptions, horizontally and are used to bridge one or more traces.

First, install a 1-pin terminal in the area below keyswitch "=".

And another one in the area below keyswitch "X", immediately above the SE-JIN logo.

Jumper from RIGHT "A" to the LEFT "SH" on the extreme right of the PCB.

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On Switch "FCTN", cut the trace between LEFT pad and switch "SH" above it.

On Switch ">", cut BOTH traces to the RIGHT pad.

On Switch "<", cut BOTH traces to the LEFT pad.

On Switch "M", cut the trace to the RIGHT pad.

On Switch "N", cut BOTH traces to the RIGHT pad.

On Switch "SP", cut the trace to the RIGHT pad.

On Switch "B", cut trace to the RIGHT pad.

On Switch "V", cut the trace to the LEFT pad.

On Switch "C", cut the trace leading away to the right from the RIGHT pad.

On Switch "X", cut trace leading away to the right from the LEFT pad.

On Switch "Z", cut UPPER trace to the RIGHT pad.

On Switch "CTL", cut the trace to the RIGHT pad.

On Switch "AL", cut ALL 3 traces.

On Switch "SH" on the RIGHT SIDE of the PCB (directly above the "AL" switch), cut the trace to the LEFT pad and the UPPER trace to the RIGHT pad.

XII.3 PUTTING IN THE JUMPERS

In the following, we will also assume that the Alpha Lock key will become a dedicated "*" -key. All other available extra keys are for the same dedicated functions as described for the ALPS KB, i.e. ", " . " ; " : " and "DELETE".

Furthermore, we will sometimes use the solderpads of the straps, which are on the other (not visible) side of the PCB. These straps run, with a few exceptions, horizontally and are used to bridge one or more traces.

First, install a 1-pin terminal in the area below keyswitch "=".

And another one in the area below keyswitch "X", immediately above the SE-JIN logo.

Jumper from RIGHT "A" to the LEFT "SH" on the extreme right of the PCB.

Jumper from LEFT of this "SH" switch to RIGHT "SP".
 Jumper from RIGHT "SP" to the LEFT "SH" on the extreme left of the PCB.
 Jumper from LEFT "ENT" to LEFT "P".
 Jumper from RIGHT "=" to LEFT "O" (ZERO).
 Jumper from RIGHT "/" to RIGHT "9".
 Jumper from LEFT ";" to RIGHT "O" (OH).
 Jumper from RIGHT "FCTN" to RIGHT "L".
 Jumper from RIGHT "CTL" to RIGHT "Z".
 Jumper from RIGHT "Z" to LEFT "S".
 Jumper from LEFT "S" to the strap (righthand pad), located directly below switch "7". The pad connects to pin 13T of the connector.
 Jumper from LEFT "X" to RIGHT "D".
 Jumper from RIGHT "E" to LEFT "I".
 Jumper from LEFT "K" to RIGHT "M".
 Jumper from RIGHT "C" to LEFT "F".
 Jumper from RIGHT "N" to RIGHT "J".
 Jumper from pin 5T of the connector to pin 12T.
 Jumper from RIGHT "B" to LEFT "SP".
 Jumper from LEFT "SP" to LEFT "N".
 Jumper from RIGHT "ENT" to LEFT "L".
 Jumper the 1-pin terminal below switch "=" to the RIGHT "SH" on the left side of the PCB.
 Jumper from LEFT "Z" to RIGHT "SH" on the extreme right of the PCB.
 Jumper from LEFT "V" to LEFT "G".
 Jumper from LEFT "V" to the remaining 1-pin terminal near the SE-JIN logo.
 Jumper from RIGHT "Y" to LEFT "T".
 Jumper from LEFT "CTL" to LEFT "AL".

There should be a total of 26 jumpers.

XII.4 DEDICATED KEY FUNCTIONS

Especially with this Korean PCB, it will be imperative that you mount the diodes flush against the board. There will not be much space left between it and the computer case.

PERIOD key, switch ">".

Connect two diodes, banded sides towards RIGHT ">", from RIGHT "L" and from LEFT "K".

COMMA key, switch "<".

Connect two diodes, banded sides towards LEFT "<", from RIGHT "FCTN" and from RIGHT "J".

COLON key, switch "/".

Connect two diodes, unbanded sides towards LEFT "/", from the 1-pin terminal below switch "=" and from the strap (lefthand pad) directly below keyswitch ";".

SEMICOLON key, switch ";".

Connect two diodes, unbanded sides towards RIGHT ";", from the strap directly below it (righthand pad) and from RIGHT "P".

DELETE key, switch "=".

Connect two diodes, unbanded sides towards LEFT "=", from RIGHT "O" (ZERO) and from the 1-pin terminal in this area.

ASTERISK key, switch "AL".

Connect two diodes, banded sides towards RIGHT "AL", from RIGHT "CTL" and from the 1-pin terminal in this area.

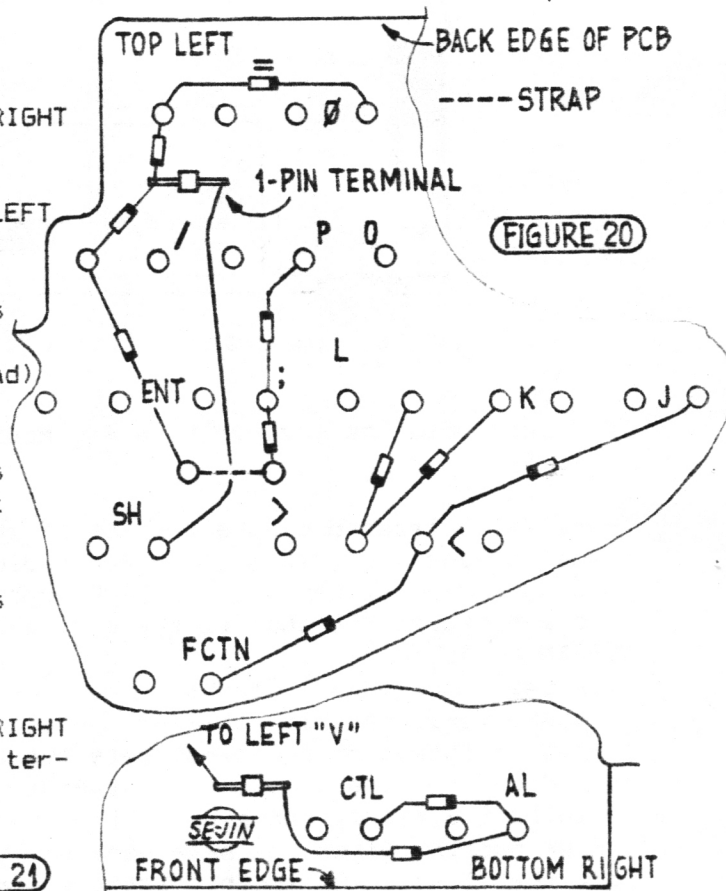
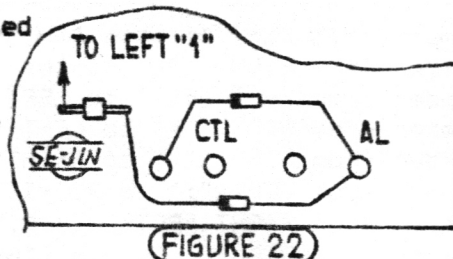


FIGURE 21

In case you need to use the "AL" key for a dedicated "@"-function instead, the modifications are:

Jumper the 1-pin terminal in the "AL" area to LEFT "1" (instead of to LEFT "V"). Connect the diodes, unbanded sides towards RIGHT "AL", from LEFT "CTL" and from this 1-pin terminal.



PAGE C

Having done this, take a straightedge, lay this diagonally across the PCB, on top of the metal flanges and check for any components that may be not be flush enough against the board.

Figure 20 shows the diode connections for the five "standard" dedicated functions. Figure 21 is for the "*", Figure 22 for the "@" connections.

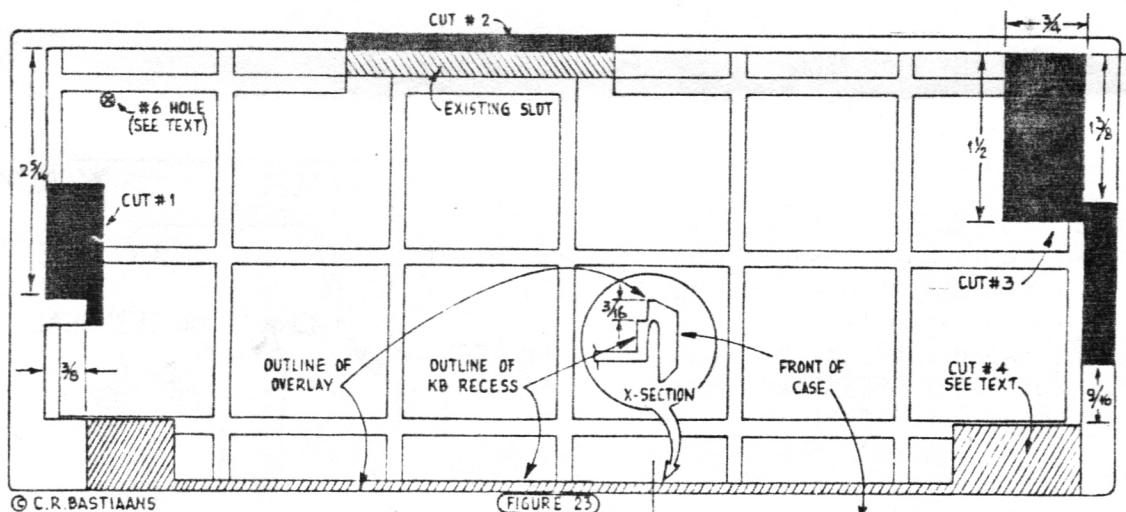
XII.5 MODIFICATION OF THE COMPUTER CASE

Figure 23 shows the topview of the computer case with the FOUR cuts necessary. Cuts #2 and #3 are identical to the ones in Figure 14 of Part 4. Cut #1 is a little larger, but it is cut #4 that makes the difference.

I recommend that you try to make this cut with a Dremel tool or a milling machine. It definitely would preserve the mechanical integrity of the computer case.

It IS, however, possible to again use a jeweler's or a coping saw; I have done it both ways and the end result can be just as professional looking.

Follow the outline of cut #4 if you elect to use a saw. If you use a Dremel tool/milling machine, limit the frontal cut to about 3/16 of an inch, as shown in the inset of the illustration. This prevents the cut from "opening up" completely. All other cuts are all the way to the bottom of the KB recess.



This concludes the instructions for modifying the Korean-made SE-JIN keyboard for the TI-99/4A.

There is at least one more version of the surplus KB available. It does not bear the "made in Japan" or "made in Korea" indications. In other words, it is made in the USA. Unfortunately, it carries the SAME number 1039019-1 as the ALPS KB, but it does NOT have a recessed PCB and its traces are totally different from either the ALPS or the SE-JIN boards!

It's been more than 3 months since I wrote Texas Instruments for a disclosure of the keyboard versions that the TI-99/4A might have had; they have ignored my letter.

I have no intention to investigate the third version (are there more??); I don't have the money, nor the time or the stamina. But if you set yourself to it, Figures 9 and 10 in Part 3 really contain all the information you need to solve your own trace and jumper puzzle. After you have done so, you may be able to better appreciate all the work that I have put in this article series!

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XIII. A POTPOURRI OF ITEMS OF INTEREST

XIII.1 YET ANOTHER SURPLUS TI KEYBOARD

At the time that I'm writing this (end of May '86), Radio Shack has yet another special purchase item (Cat. No. 277-1023), again a surplus TI keyboard. This is reported to be a keyboard for the TI 99/4 (without the addition A). Even though it has the same matrix (Fig.9 of Part 3) as the other TI KB's, and it will fit inside the 2068 case, whether it has the cutouts of Figure 14 or 23, it would not be feasible to modify for use with our TS2068! The reason: it is a membrane type keyboard! A real pity, since this item only costs \$3.95...

You couldn't even consider this keyboard for spare parts; keyswitches and keytops are different from those of any of the three keyboard versions I know of. Maybe some day, someone can come up with the proper translation circuitry to transform the TI-99/4A matrix to the TS2068 matrix and put it on an EPROM. However, we may run into a problem with certain simultaneous key-stroke commands, such as the the combination G and H keys to restart "Horace Goes Ski-ing".

XIII.2 THE BALSAWOOD MASK

Another item, which appears to puzzle some of you, is the mask, which covers up the ugly holes around the TI KB you have put in. Figure 24 shows an exploded view of the 11 components. Dimensions are given in MILLIMETRES (mm), but these are ONLY MEANT AS A GUIDE. Before cutting each part, check the sizes you actually need for your particular KB. There are some dimensional differences between KB's!

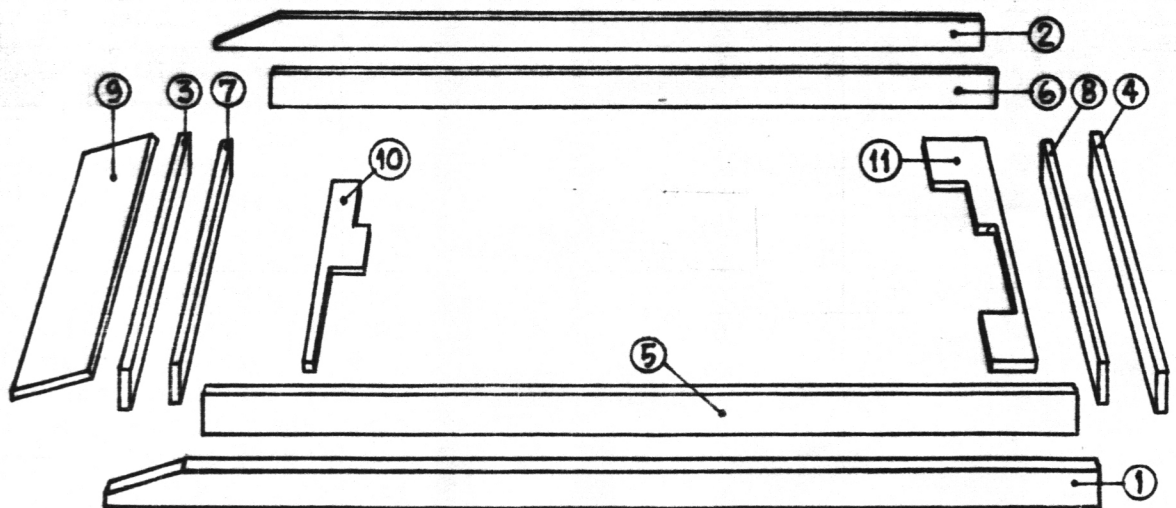
The modified keyboard should be in place.

Cut the 1/8 inch balsawood ONLY with a #11 Xacto blade. Don't use any type of saw!

Use a fast-cure two-component Epoxy adhesive to stick the wood parts to the metal mounting brackets.

Use Elmer's Professional Carpenter's Wood Glue to glue wood to wood.

USE WAX PAPER BETWEEN THE MASK AND THE COMPUTER CASE, to prevent it from sticking together.

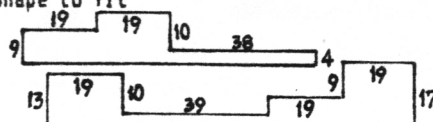


1=2= 260 x 10 x 240
 3=4= 102 x 10
 5=6= 234 x 11
 7=8= 96 x 11

9= 102 x 22, shape to fit

10= 76 long;

11= 96 long;

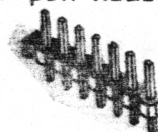


USE 1/8 INCH BALSAWOOD THROUGHOUT
 DIMENSIONS IN mm,
 but are approx.

FIGURE 24

XIII.3 MULTI-PIN HEADER STRIPS

It seems that some people have a problem locating these and it might help if they knew what these components look like. Well, here is a picture of a 7-pin header strip.



XIII.4 THE TI KEYBOARD "MAKE-OVER"

Figure 25 on the left shows a full-size photograph of a completed keyboard with all of the printed keytops as discussed in section XI.3 of Part 5.

Compare these with the original keyboard of your TS2068 and see if it doesn't make a lot more sense. I suggest that you read sections XI.1.1 through XI.1.5 again so as to fully understand my philosophy.

Another tip: in order to make for surprisingly durable keytops, using the printed labels, it is important that you use a good brand clear spray, applied in many layers. I have had good luck with Red Devil High Gloss Clear Lacquer. It is an extra fast drying spray and has an adjustable nozzle. Adjust it for a HORIZONTAL spray pattern.

Never spray the keytops while they are in place. Remove them, make sure that the labels have been properly burnished and align the keys on a piece of sturdy corrugated cardboard in 5 rows, leaving about one keytop width all around each key.

USE DOUBLE-ADHESIVE TAPE to prevent the keys from shifting about.

Spray in a dustfree environment and spray in slightly overlapping vertical movements.

Turn the cardboard substrate 90 degrees and spray again. Repeat this two more times and allow to dry for several hours. Repeat the entire process one more time. When you're all done, the top surface of each key has had 8 coats and each vertical surface has had 2. Right?

This concludes my Keyboard Mania series. I hope that it gave you the impetus to try your hand on a worthwhile hardware project! I would appreciate hearing from you. Good luck!

© C. R. Bastiaens

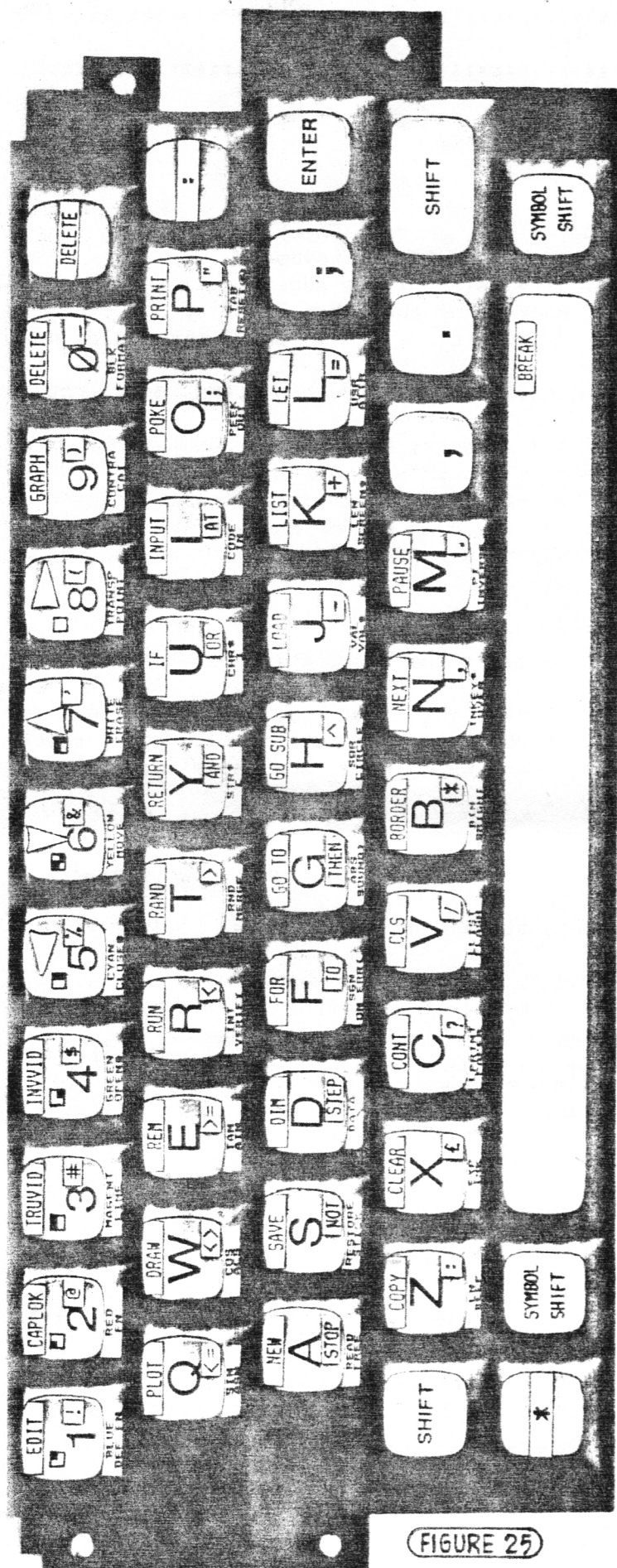


FIGURE 25

4-30-86

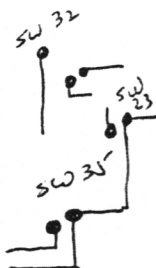
Readers

Feedback

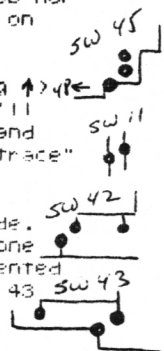
Have enjoyed your article Keyboard Mania - especially part 3. In Part I just received my TI keyboard. And in reviewing your instructions I find some problems.

My keyboard is #1039019-1, but does not have a "recessed" PCB nor any mention of a manufacture. Further, I find the section on cutting confusing.

If I hold the keybd w/ the ribbon cable on top (i.e. facing up) I run into some problems. Sw. 45 better be jumpered or I'll lose other keys. Sw. 11 has 2 solder pads and 2 lines in and out. Which "bottom trace" - left, right or both? "Upper trace" on both sides - do you mean both traces?



SW 32 has 3 pads - 2 side by side and a 3rd off to the side. Which pad is the top pad? Sw. 22 ditto. Sw. 42 only has one trace coming off the bottom pad (assuming the keybd is oriented correctly). How can one cut one trace on both sides? Sw. 43 only has one bottom trace and it is the major one!



Sw. 35's upper pad is linked to Sw. 23. Makes me think I have the keybd oriented wrong. But if I rotate it then the ribbon cable is on the bottom, not the top.

Almost all the other switches have similar problem. Further, your drawing of the TI matrix has the Alpha Lock on top - my keybd has it on the bottom.

I'll not cut until I get the next issue of LIST, but I think that you need to clarify your instructions a bit more - especially if there are more than one kind of keyboard out there. Looking forward to your reply - or mention of it in the article, etc.

Dear L.L.

L.L.

In Page A of Part 3 I have clearly identified TWO Texas Instruments TI-99/4A Keyboards, both of foreign make. US law requires that all imported goods be properly identified as to the country of manufacture.

Therefore, if your TI keyboard does not have any such indication, it simply means that it was made here in the USA.

It is very unfortunate that your keyboard shows the same 1039019-1 number as the ALPS-made KB, which has - contrary to your KB - a recessed PCB.

More than 2 1/2 months ago, I wrote to Texas Instruments for clarification on all versions of their TI-99/4A keyboard, even though I had no intention of trying to modify ALL of such versions for inclusion in the TS 2068 computer case. After all, who has the time or the money for such a mammoth project. I just wanted the information so that I could advise people with questions, just like you. TI has elected not to answer my letter.

Anyway, it should be clear that the trace cutting instructions given in page C of Part 3 do not apply to your particular KB. I clearly indicated in line 11 of page A, Part 3, that the procedures to be described were only for the KB in question, the ALPS KB, made in Japan, with a recessed PCB.

No wonder then, that you could not make head nor tail of my trace cutting instructions. Once again, they don't apply! And I can certainly not comment on the descriptions with the illustrations that you gave in your letter. All I can say is, that they have also no relation to the SE-JIN KB (made in Korea), full instructions of which will follow at a later date.

As to your remark about the matrix drawing showing the Alpha Lock on the top. The matrix is a SCHEMATIC depiction of wiring, printed circuit or point-to-point. It is drawn for maximum CLARITY and in most cases has little to do with the physical layout of the components. Look at the keys in the matrix, marked /, =, ;, EN, SP, FN, CT and SH. These too are not depicted according to their physical layout; and you can maybe imagine yourself how confusing the matrix would have become, if indeed they had been!

Concluding, there is nothing for me to add to the already VERY CLEAR instructions in my Keyboard Mania series. They just don't apply to your keyboard. I'm sorry.

All I can do, is point out to you that with the help of Figures 9 and 10 on Page B of Part 3, you should really be able to find out which traces to cut and where to put jumpers. Figure 9 shows you the situation on your KB, whereas Figure 10 shows you what it should become. Since you appear to have some misconceptions about matrices, maybe I should tell you that if on Figure 9, I have indicated that key Z is connected to key A, that it need not in actuality be so connected! Depending on how the traces on the KB are laid out, key Z may be connected to key Q, or key I, or key O, or key P, or key ; or key / or it may indeed be connected to key A! What REALLY matters is that all of these keys are on one side of their contacts, ULTIMATELY CONNECTED to pin 8T of the 15-pin ribbon connector!

A final word: you don't have to worry about the 29 keys depicted in thin blocks in Figure 10; these are already properly connected. However, sometimes one or more of these keys get inadvertently disconnected from their address or KBD lines, because of the trace cuts necessary for the matrix modifications of the other keys! A jumper to the appropriate point(s) will correct such situations.

Thank you for your interest in my article series and I hope that you will persist and eventually solve the matrix puzzle and build the TI KB into your 2068. It is really worth the trouble... -Cedric-

Long Island Sinclair Timex Group

SUPER SUMMER MEGA ISSUE

3130 BRYANT LANE

MARIETTA

GA 30056

5/13/86



Industrial Designers/Visual Marketing

GEORGE GILDER ASSOCIATES, INC.
6738 108th Street, Forest Hills, New York 11375 - 212 544-1106

Paul Donnelly
LIST
P.O. Box 438
Centerport, NY 11721-0438

Dear Paul,

I have enclosed two copies of a START program that may be of interest to your readers.

One copy is in regular 2040 style and the other in "fat"
The enclosed article is self explanatory.

Sincerely,

George Gilder
George Gilder

GOLDEN VENDOR AWARD

Goes to B&B Micro PO Box 280298, Dallas, Tx. 75228.
They sell semiconductors (e.g., 4164-(64K dynamic RAM) for .95! My order for 27 was shipped and received in less than 7 days. When the chips wouldn't work I called B&G. They said "no problem and promptly shipped 27 more of another brand. That way if both sets didn't work in my machine I'd only have to make one mailing to get my money back. Thank you B&G for doing business the right way. (It cost me .39 to mail back the non-working chips)

RD.

New and used Sinclair QL items

	COST
2 Sinclair QL computer british model one with US power supply the other with an English power supply (requires an STEP up converter) 15 ROM (latest version) + version 2.0 software.	\$210.00
1 PCML Disk interface with toolkit in ROM + RAM disk software with 1 DSDD 7 1/4" disk drive (the disk drive is from ENGLAND so it must be used with an STEP up converter)	\$255.00
1 Miracle Systems LTD 512K Memory pack	\$155.00
1 QL Supercharge BASIC Compiler	\$75.00
1 Eidersoft ICE + CHOICE	\$35.00
1 GIGA SOFT MOUSE system GEM like desktop	\$80.00
1 Miracle Systems LTD MODEM adapter with software	\$29.00
1 Sinclair QL Assembler	\$29.00
1 Cartridge Doctor	\$16.00
1 QL Super MONITOR by Digital Precision	\$23.00
1 Sinclair QL Paint (drawing program)	\$29.00
1 Miracle Systems LTD Centronic printer interface	\$37.00

If anyone is interested call soon at (718) 275-3149 anytime
Everything must GO!!!

Send money order or check to: Mr. Derrick Hall
361 Autumn Avenue
Brooklyn, NY 11208

Call before mailing payment, to make sure item is in stock
Make payment out to name above. Check takes 3 working days to clear
All items will be ship by POST OFFICE (First Class mail insured)

Let's make a Deal!!!

HI

If there are users of the Kempston disc interface out there I would be interested in your experiences with it since mine have not been entirely satisfactory. I purchased the Kempston interface and 5.25 inch disc drive direct from Kempston last October. The major problem has been that I find it very difficult to get a good program save to disc. Usually the disc copy is corrupted. Apparently this unfortunate experience has been common to many Kempston users.

I have spoken to one Kempston user who seems to have had success with 3.5 inch discs. I see that Kempston are now selling their interface only with 3.5 inch drives. I've had no response from Kempston to my letter. I have been in touch with a Sinclair users group in South Africa who have been successful in getting a response and at the moment I am waiting to find out what they learnt from Kempston.

Another matter I need help on concerns the TESCO SS Personal Writer/ Multi Printer. Does anyone know where I can get spare ribbon cartridges? I'm in desperate need of some spares. Also the TESCO SS has a rear socket for a Centronics parallel interface adaptor, can anyone help with this item?

Back to Kempston. When the disc works you will find Interface III excellent for transferring tape software to disc. Just make a tape copy via Interface III, then use the Kempston COPY command to transfer the tape copy to disc. Finally change the syntax of the two line loader created by interface III to MOOS syntax.

Finally what future do we T&S users have now that Sinclair has sold out to Astrad? The QL is now dead and the Spectrum 128 will spell the end of 48K software to run on our TS2068's with ROM switches or Emulators. Please tell me I'm being too pessimistic.

If anyone can help me please write or call 404-565-3879 (H) or 404-553-5351 (O).

Best wishes
Tony Brooks

Dear Paul,

I purchased a Sinclair ZX-81 in 1982 and a TS-2068 in 1984. They are fine computers, and I have enjoyed them thoroughly. In 1985 I learned about your fine newsletter, and I subscribed during that year.

Unfortunately I am no longer able to use my Timex-Sinclair materials. They are now sitting on my shelves (well protected, and not gathering dust!) I would appreciate it if you would publish this letter in your newsletter. I would like to sell my Timex-Sinclair materials; perhaps some of your readers will be able to benefit from my inability to continue with the TS line.

I have 3 computers, a printer, a tape recorder, tons of software, many books, and lots of miscellaneous material. If any of your readers sends me a SASE, I will send him/her a complete listing of what I have at very reasonable prices. Everything is one of a kind.

132 HILLDALE ROAD
DOBBS FERRY, NEW YORK 10522
MAY 27, 1986

Sincerely yours,

Arthur D. Brady
Arthur D. Brady

L.I.S.T. USERS GROUP
PAUL DUNNELLY
P.O. BOX 438
CENTERPORT, NY 11721

Dear Paul,

The MIDWESTCOM was great! The best part for me was to get to meet you and other active people face to face. What topics were discussed! What marvelous products were displayed. What great bargains were offered. Now if they only didn't close up the lunch room---

My being there was fortuitous for two reasons. The WIDJUP Co. was left off the invitation list by some accident, and my health was good enough to make the trip with some welcome help from my son (RHIGR USER). Then, nowhere could I find a single phone number to call. A telephone company supervisor rates a list for giving me a list of possible numbers to call. I connected on the second call.

By the afternoon of the second day, I'm afraid I was no longer bright and bushy tailed. In fact I might even say I was not too sure of what I was doing. I accidentally erased my INVOICE program. It was then that my son broke out all the tabs from all the other masters on hand. Good show!

It did not surprise me that there was such good attendance. What did, was the high level of expertise shown by most of the attendees. Never, since the Lunar Landings, have I had to field such a blizzard of highly informed questions. It was like the "old days".

I imagine I was a surprise to some--kids don't own computers! I date back to a primitive era. We refrigerated a two story brick building full of 12RU's and called across the room using triotical mnemonics. We were lucky to get ten minutes of running between crashes. Programming was done partly with plugs, wires, and patchboards.

Popular "use" of computers has fallen back in numbers. Some say the computer fad is over. I would say that it is high time that manufacturers begin to respect the intelligence of the not-so-common man, and get down to providing more than short-lived games and entertainment. Canned programs have their place, but where would BASIC be if everybody paid attention to limits?

I know many people who despise it as a "beginner's" language. Generally it is those same people who demand it done their way. BASIC will change as a living language should. Let's not try to change the name--because language is truly BASIC. Try doing without it.

I don't mean for you to drive nails with a dictionary. Where else can you find so many tools in such a small box?

Where did I put that INVOICE program?

Bill:

William J. Pedersen

Great meeting you too! The people we discussed, whom you should talk to are:

Tom Woods (PRO/FILE MARKETING
PO Box 64 & CONTACTS)
Jefferson, N.H. 03583
(603) 586-7734

Tom Bent (ML PROGRAMMING &
I Tom Woods HARDWARE) (TOM BENT
Or Capital Users IS FROM MD/VA AREA)
PO Box 725
Bladensburg, Md 20710

Ray Kingsley (Hot Z)
PO Tom Woods

John Olinger (Hardware)
11601 Whidbey Drive
Cumberland, In 46229

Wes Brzozowski (Hardware & SW)
I Sincus
PO Box 513
Owego, N.Y. 13827

Try contacting these notables.

Paul D.

Dear Mr. Bastiaans;

I am a L.I.S.T. member and I write you now in regards to your keyboard modification articles for the T/S 2068 computer. More specifically, I refer to Keyboard Mania, part 5, June 1986, L.I.S.T.ing. On page 5, "XI The Keytops", you mention that there is no source of ready-made keytops like Mule Electronics adhesive backed vinyl ones. Well there is. They are made by SAGA Systems Ltd. 2 Eve Road, Woking, Surrey, ENGLAND. GU214JT and cost two pounds sterling (\$2.00). Saga is a third party key board add-on company for the ZX Spectrum computer. Thier adhesive backed vinyl keytops are not as thick as the Mule one from L.A., and they do have rather garish red and green colors but they are as close as anything you'll find for the T/S 2068.

I must say I enjoy reading your articles. Every issue I say to myself, "now there's a man who knows what he's talking about" I wish I had the talent and skill for making keyboard mods to my T/S 2068 as in figure 15. Gorgeous! You wouldn't consider selling one would you?

I would prefer you incorporate this information into your articles rather than blantly reproduce my letter as is. Also I would rather you NOT publish my name and definitely NOT publish my address. Thank you.

Sincerely Yours.

L.I.S.T.
P.O. Box 438
Centerport, NY
11721-0438

27 May 1986

Dear Paul

Since I wrote last (dec.) I have not received another issue. I guess you didn't like my letter! I had also enclosed a check for renewal.

When I wrote in Dec. I sent a diagram for a circuit that would allow two 16k timex rampac's to be connected to a T/S 1000. There was a mistake in the drawing, the output from the 74LS138 should have been taken from pin 11 not pin 13. I've worked out the decoding for the third rampac (48 to 64k space) the diagram is enclosed. While using this board to troubleshoot a rampac that had been causing my machine to crash I ran into an interesting problem. With the troublesome rampac mapped above ramtop I ran a program which poked in random numbers then peeked and compared. The program kept indicating errors but never with the same memory locations. The errors were always off by 2 which pointed to the D1 ram chip. I replaced the chip and solved the problem, however on close examination of the chip I could see the raised letters of another number 4116-7N this is a much slower ram chip than the 4116-4NS which are standard in the rampacs. I wonder how many of those slipped past Timex (4116-4NS was stamped on the chip in white ink but with the light just right the other number was visible).

I've also built a centronic's input port which allows me to transfer data into my T/S from my Apple printer port. I can now write programs with ASM and use my T/S to place them on EPROM. I also use an extra T/S (and three rampacs) as a 64k printer buffer. I have a few replacement ROMs left (printer routines rewritten for Byte Backs centronic printer I/F) for \$15.00 each.

Thanks for supporting us remotely located T/S hacker's and please send my missing issues.

Sincerely yours

Don Dailey
48 Aspen
Great Fall, MT
59405

Don:

Ouch! Right you are! Your back issues should have already arrived. Mea Culpa.

Thanks for the Rampack and Centronics plans, they're in this issue.

PD

To the member who wanted two Spectrum ROMs for \$15.00.

Sorry, again, they are simply not available for that price. Your subscription will be extended if we can cash your 3rd party check.

LISTA

The Long Island Sinclair Timex Group,
P.O. Box 438
Centerport, NY 11721

Dear Sirs:

I read a blurb in a magazine about your group and would like some more information about it. I own a Timex Sinclair 1000 and am interested in getting some further use out of it and obtaining accessories for it. So, would you please send details about the services you offer.

Thank-you

Brian Walter
Brian Walter

Brian Walter
42 Kline Pl.
Dunellen, NJ
08812

This reticent member even sent along sample for Cedric. That's super! So I'm Blatant, but as I've said before--I don't do handouts.

2068 BANK SWITCHING Part IV

It was said that the SCLD outputs signals through IO port "A". This is a perfect example of a half truth which can totally misdirect an analysis of the true circumstances. It is akin to the text book discussions about the SCLD wresting control from the CPU when in fact it ~~gives~~ it.

It is corporate nature to try to maintain proprietary control over follow-on sales of additional equipment. One example of this is the fact that FORD, GM, and almost all other V-8 engines have identical firing orders--but just look at what their individual technical manuals say!

In the same way, DZIN and DZOUT are deliberately misleading as labels, though a corporate executive might strongly argue that.

In the view that the TS2068 is the BOSS, these labels could have some validity, but only for TIMEX products which were never produced.

Such being the case, the entire data published about the TIMEX bank switching controller is:

PURE FICTION!

There ~~might~~ have been one. One ~~could~~ be made to those specifications and protocol, but it would be meeting corporate goals, not yours.

DZOUT is bidirectional, as is DZIN. Not only that, neither signal implies daisy chaining. They are analogous to ATN and ACK on the IEEE488 buss. The direction depends on which device is the current BUSS MASTER. In a network of computers the 2068 might be boss, but more likely it would be in TERMINAL, or even PEER GROUP CONTROL mode.

As a SLAVE, it would never ~~issue~~ ATN (DZOUT), but ~~responds~~ to it by completing current operations and releasing ACK. When all slaves have released ACK, the BOSS that issued ATN takes over.

Actually it is more accurate to say it is the bank switching controller rather than the 2068 which provides these features, but "bank switching controller" is another misleading choice of words. "Peripheral Control Adapter" is a much better name.... but lacks the pizzazz some would demand. GPIB is close, but...

The 2068 ~~data~~ contain ~~part~~ of a Peripheral Control System. This part is NOT FICTION! It is very REAL. It is this real function we can use to advantage.

The SCLD permits, or rejects, reads and writes to any ports or memory under its control. It is not in any way the ~~source~~ of signals to IO port "A", but it does send status and interrupt status data to whatever CPU may be in charge of the buss. A DEMO program called "Sherlock Holmes" graphically displays this. (External CPUs are not synchronized as the home Z80 is.)

The result of the CPU trying to read port "A" is sometimes a detour to reading a signal from the SCLD instead.

The SCLD uses the same method to pull data bit 0 low for all interrupt cycle vector fetches in IM2.

BUSISO is ~~not~~ misleading. It is a local signal; one purpose of which is to prevent interference from the joysticks.

There is no way for the joysticks to generate, nor interfere with an all 0's output on port "A". For this reason, 0's output on IOA0 to IOA3 is the trigger signal to turn BUSISO on.

IOA5 (it really is) has another function. When BUSISO is triggered, it steers control to either of two port "A" devices. A value of 0 is assigned to the TS2068 peripheral protocol. In practice, it is more useful as a disable signal to the local controller when another buss master is in control, though it is just as possible for the external buss master to use the same local controller.

When enabled, the "PCB" receives bytes through port "A" as multiplexed "nibbles". It also receives control signals over address lines A13 to A15. This is the existing system. Beyond that, you can build as elegant a system as you wish. This lets you build systems even more powerful than IEEE488. Bank switching is a typical add-on.

A small system with the 2068 being the BOSS is capable of up to 12 megabytes of memory. This is 253 banks of 7 switchable chunks of 8192 bytes each. (Actually, it is unlimited when you define "superbanks".)

Contrary to published information, chunk3 has the highest priority to be bank switched. It is in contention with DRAH. If not switched out, operations in chunk3 (and chunk2) will be a lot slower. This has been discussed for the SPECTRUM. The re-configured memory assignment using chunk7 for the stack and the DOCK for SYSDON could easily be considered standard. Oddly, it seems the bank switching routines were originally written that way before barriers were installed.

A multi-user system could be implemented with each user owning their own personal shadow in chunk7.

Going further, BASIC can be relocated out of contention space with parts of it stored in "overlays" from other banks. With proper technique, you don't have any need for FREE. BASIC can USB call the bank it needs.

Pandora's box is open! Long live the 2068! (and clones)

A simple bank switching controller consists of BUSISO, demultiplexing, enabling latches, and little else. The BEU chips are the workhorses. They contain HS and STATUS registers, address selectors, and issue BE to the SCLD. Whether you want to use daisy chaining; serial, or parallel polling is up to you. Even a minimum parallel poll system beats you know who. (Rhymes, too)

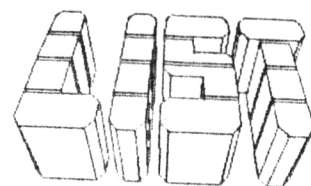
There is now no stopping the independent development of great hardware! I made some statements recently about trying to adapt programs and hardware designed for the crippled TS2068. The way eyebrows raised, or furrowed, forces me to explain.

There are excellent products available. It is not their fault that it just isn't worth doing! Most people aren't worth knowing either--not because they are worthless, but because you only have so much time. Now is the time to rearrange priorities, not be slaved to old ones. I know I was misunderstood by most.

My apologies for not making myself clear at the time.

This concludes the series on bank switching. Perhaps now you can see why it must. A text on peripheral control weighs a few pounds. How much does LISTING weigh?

William J. Pedersen



LONG ISLAND
SINCLAIR TIMEX GROUP

**SUPER
SUMMER
MEGA
ISSUE**

14

Hello to all of you out there with modems in hand, and telecommunications on your mind! I am here to proffer some hints and help to those novice (and experienced!) computer users out there who have modems and want to know more about how they work and what to do with them.

First of all, let's talk a little bit about the modem itself. The word modem comes from two different words *MOD*ulate and *DEMOD*ulate. This simply means that the modem takes signals from the computer which are digital (1s or 0s), and changes them to analog (varying voltages) signals, in the form of tones. You have heard these tones. They are similar to touch-tone sounds, but much higher in pitch. The caller uses what are called *ORIGINATE* tones, while the computer that answers the phone uses *RECEIVE* tones. The reason for the different set of tones is for ease of knowing who is sending and who is receiving data.

Now that we know what a modem is and what it does, we should know a little about what exactly the modem is sending over the phone line to another computer. A term you must come familiar with is the *DATA WORD FORMAT* or *PARAMETERS*. These determine how you send data. First, there is *DUPLEX*. This refers to whether you are sending or receiving. *FULL DUPLEX* means that you can transmit data *AND* receive data at the same time. *HALF duplex* means that you are doing one or the other at one time, but not both. Most computer systems tell you to use *FULL duplex*, which you should do, unless you are positive that *HALF* is required.

The *DATA WORD* is the number of bits that the modems send per byte it receives from the computer. The data word is broken down into three characteristics: *WORD LENGTH*, *PARITY*, and *STOP BITS*. Word Length is either 7 or 8 bits. "But I thought that the Sinclair is an 8-bit system? How can it send 7-bit data?" Well, standard ASCII code only uses characters 0-127. This is only a 7-bit, byte length. The Sinclairs use 128-255 for special purposes. Thus, the 8th bit. Parity is a form of error checking. You can have *ODD*, *EVEN*, or *NO* parity. Stop bits are not really used. You can have either 1 or 2 stop bits. The only reason that there are such things is because they were used in old Teletypes that were slow. The most common settings are 7/1/E (that means 7-bit word, 1 stop bit, and *EVEN* parity) and 8/1/N (that means 8-bit word, 1 stop bit, and *NO* parity). A lot of systems use the 7/1/E setting. If you get garbage on your screen with that setting, try the 8/1/N.

"OK" you say. Now that I have a basic understanding the modem, what do I do with it? Well, you now have many options. The first that most modems users try is to call BBS's. A BBS is the acronym for *Bulletin Board System*. This is simply a computer that has a program that allows you to call and leave messages and mail to other users on that board. Most BBS's have *MUCH* more than that. A lot have on-line Games, Uploads (you send a program to them), Downloads (they send you a program), and various other things. Getting the phone numbers to these BBS's is usually easy. If you have a friend that has experience with them, he can usually suggest some to call. If you know of no one who uses BBS's, look in newsletters such as this. In the last issue, there was a list on page 8.

Here is my address: Eric Yruegas
4706 Langley Ave.
Whitehall, OH 43213-3124

Now that you have a number to call, you must find a way to call it. If you are using *MTERM* or *ATERM* for the TS2068, you will find a selection on the *MAIN MENU* that says "Auto-dial telephone". This is a convenient way to call. I prefer a different way. Since most of the BBS's I call are busy a lot, I have a phone on my desk that I use to call first, to see if the line is busy. If the computer answers (you will know!), I go to terminal mode immediately and issue the "m" modem command. Refer to your *MTERM* or *ATERM* manual for an explanation. I then hang up my voice phone, and I am connected to the BBS. Voila!

Well, that about concludes this month's discussion on Telecommunications. If you have any questions or comments, please feel free to write!

REVIEW OF A HAPPENING IN OHIO

By John A Sampson

Well, I finally got to go to an honest to goodness *Timex/Sinclair ComputerFest*. I had missed the one they held in Boston in November of 1983, so when I heard about this affair, I said "Self---You better get to this one."

I flew to the Cincinatti Airport (which is in Kentucky by the way) early Saturday morning, stayed overnight at the Ramada Inn where the Computerfest was held, and flew back to New York late Sunday night, after two very nice days at the affair. Between plane fare, car rental, motel room, food and miscellaneous expenses, it cost me about \$250.00, not counting the little I spent for the goodies.

Well, I wasn't disappointed. I am told almost 300 people from all over the country attended, and they had a good showing of about 30 suppliers of T/S products.

I got to meet and talk with Tom Woods, Bill Russell, Jerry from Aerco and Tom Bent to name a few.

They had a good array of T/S products on display. I would estimate that there was about 40 percent QL, 20 percent ZX81 and 40 percent TS2068 and/or Spectrum.

In addition, the people who ran the show scheduled ten hourly seminars, five on Saturday and five on Sunday. These seminars were free and covered such topics as, Machine Code Programming, Forth, Using Data Bases to name a few, and were very interesting. I attended five of them, and I got a few answers to some questions.

The only negative thing I could say about the computerfest, is that the Ramada Inn was about 30 miles from the airport and they did not arrange inexpensive, reliable transportation for the incoming guests. I don't know if it was the fault of Ramada, or the organizers but I chose to rent a car so I was not inconvenienced at all.

Now that I look back on it, it was great. The weather was beautiful, everything went smoothly and I brought back some software I didn't have before, a brand new TS1500, some back issues of CTM and a new Aerco DOS.

If there is another Computerfest being held somewhere, I advise all of you to attend. You probably won't regret it.

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ALUSSIER MEMBER
7907 ELMELL ST.
BURNABY, B.C.
CANADA V5E 1M3
T/S USERS GROUP OF Vancouver
#109-1205 Johnson St.
COQUITLAM, B.C.
CANADA V3B 6E6
JOHN BROMBERG

Victoria SUNT Association
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Victoria BC
CANADA V8X 2T6

CALGARY T/S USERS GROUP
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CALGARY, ALBERTA
CANADA T3A 2G2

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MERCER, CA 95340

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P.O. BOX 34545
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SACRAMENTO, CA 95623

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VISTA, CA 92083

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974 S. VICTOR WAY
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C/O JEFF BROTHERS

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P.O. BOX 5239
WASHINGTON, DC 20015
C/O STEVE DATT

MIAMI SPEC. INTEREST GROUP-ELF
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MIAMI, FL 33179

SOUTH FLORIDA ZX USERS GROUP
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WEST PALM BEACH, FL 33405

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SAFETY HARBOR, FL 33572
WILL BECKER
MEL Nathanson

T/S COMPUTER CLUB OF CENTRAL FL
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ORLANDO, FL 32801

T/S TECHNOLOGIES USER GROUP
11031 S.W. 4TH STREET
MIAMI, FL 33165
C/O JOSE MORENO

ZX/TIMEX GROUP
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TITUSVILLE, FL 32780

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FORT PIERCE, FL 33450

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SINCLAIR END USERS' GROUP
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PALATINE, IL 60067
C/O DIANA WRIGHT

TIMEX 1000 NATIONAL S/U EXCH
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LA GRANGE, IL 46761
C/O GREG GUNTHERP

PORTSMOUTH T/S USERS GROUP
HC63 BOX 650
GREENUP, KY 41144
(606) 473 5791
C/O JOHN MARION

CAPITOL AREA T/S USERS GROUP
P.O. BOX 725
ELDENBURG, MD 20710
C/O JULES GESANG

JUMPERS 2054'S (GLEN BURNIE)
7837 B&A BLVD
GLEN BURNIE, MD 21061

BOSTON AREA T/S USERS GROUP
4 EX ROAD
BILLERICA, MA 01821
C/O RICK HEISER

BOSTON COMPUTER SOCIETY
17 CHESTNUT STREET
BOSTON, MA 02108

SYNTAX - THE HARVARD GROUP
RD 2 BOX 457
HARVARD, MA 01451
(617) 456 3561

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TUG-DC
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FL North, TX 75116
Tim Ward

Dallas Timex User Group
2624 East Park Blvd.
Plano, TX 75074
Julie Barrett
C/O JED JENKINS

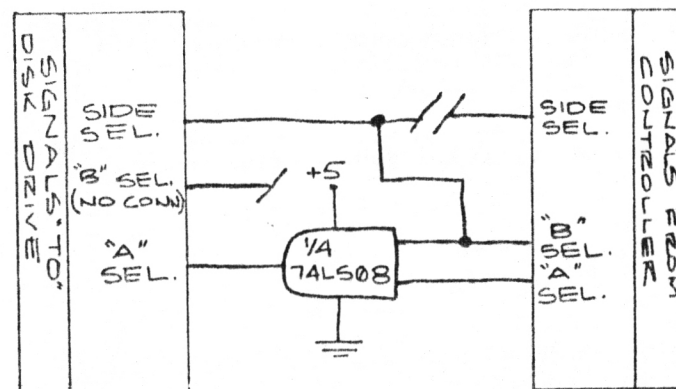
SEATTLE AREA T/S USERS GROUP
3501 88TH S.E. APT 350
MERCER, WA 98040
(206) 236 0470

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P.O. BOX 101
BULTER, WI 53087

USING DOUBLE SIDED DRIVES WITH A TIMEX DISK CONTROLLER

After using a Timex disk controller with two 5 1/4" double sided disk drives for a few weeks, I could'nt bear the thought of only being able to access one side of the disk. I opened the disk controller and traced the side select line to a controller chip. Apparently the controller has the hardware capabilities to use double sided drives, but the Timex Operating System does not support them. Not having the knowledge or desire to rewrite the TOS, I found a way to modify a drive so that it will access both sides of a disk. The circuit "intercepts" the B-Select signal and sends it to the A-Select and Side-Select lines on the drive. When the controller accesses the "B-Drive" it really gets the back of drive A.

The diagram below shows the modification I made to my drive. I only changed one unit so I would have a "stock" drive in case something went wrong with the modification. (it did'nt) Follow the circuit diagram to modify your drives. You will have to figure out how to do the actual "cut & jumper" changes yourself. As always, please don't try to modify your drive unless you know what you are doing.



John Bell



A PRINTING PORTA-PACKET TERMINAL FOR \$139

Bob Bruninga WB4APR
59 Southgate Avenue
Annapolis, MD 21401

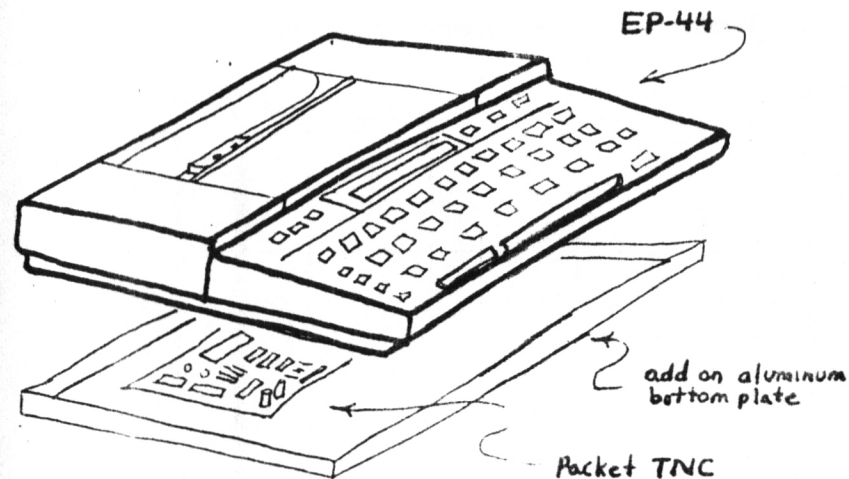
First Tom Clark bought one and then I followed suit. This BROTHER model EP44 is a battery portable typewriter that not only has full editing and memory printing capabilities, but also has a built in RS-232 port for use as a portable data terminal. It is just what we have been waiting for as far as emergency communication in the field. It runs on 4 D size batteries or an external adapter. It can type on plain paper using a thermal ribbon or thermal paper either individual sheets or rolls.

For packet use it has a serial port with a 3 volt swing that can be configured for 75 to 1200 baud. It also can use both X-line or X-on X-off handshaking to make up for the relatively slow print speed. The print buffer is 160 characters long. The print speed is probably about 300 baud, but including the carriage return time it works out to be more like 110 baud throughput. The keyboard includes a 15 character LCD display for previewing and fixing typing errors. The print head includes a 24 by 18 matrix which gives letter quality characters. The overall dimensions are 13.2 x 10.5 x 2.2 inches which easily fits into any briefcase.

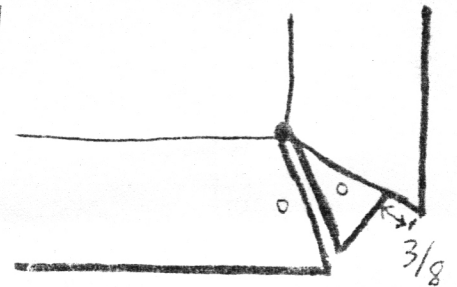
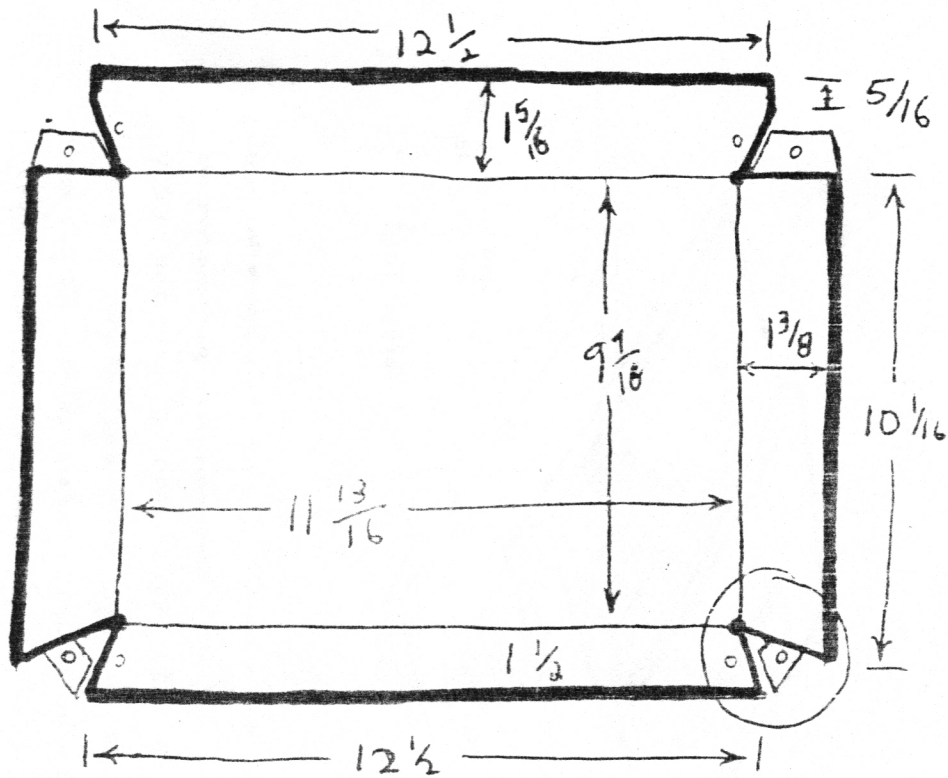
My porta-packet plans are to build a new false bottom spaced about 1/2 inch below the existing bottom to include a TAPR TNC-11 with most of its power supply bypassed to run directly on 5 to 6 volts from the battery pack internal to the typewriter. There is a nice lip already around the bottom which will fit nicely into a formed aluminum backplate. I will have to go inside the typewriter to bring the battery voltage out on the extra pins in the DB-25 connector on the side. From the new bottom plate which houses the TNC, all that is needed is the audio and PTT connections to my ICOM-2AT to complete the porta-packet station.

This looks like a fantastic buy at only \$139 and I hope that we can now go to the field with Packet Radio and show the world what we can do. This article has been typed using the EP44 on plain paper using the thermal ribbon.

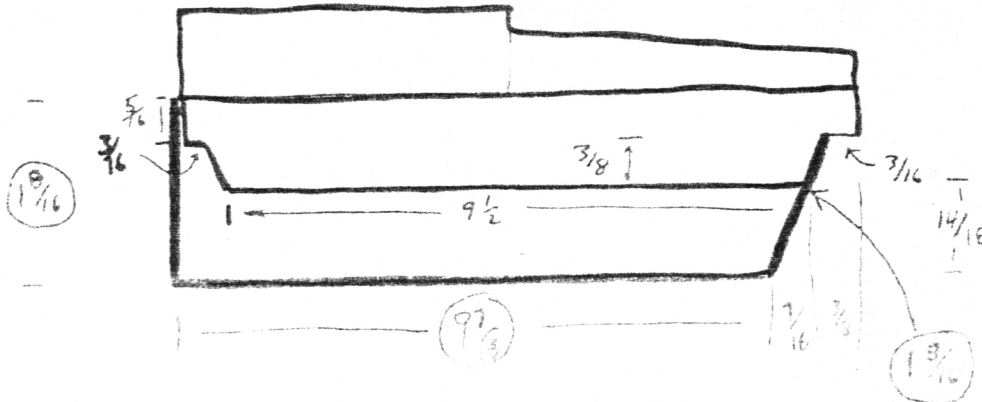
WB4APR PORTA-PACKET TERMINAL



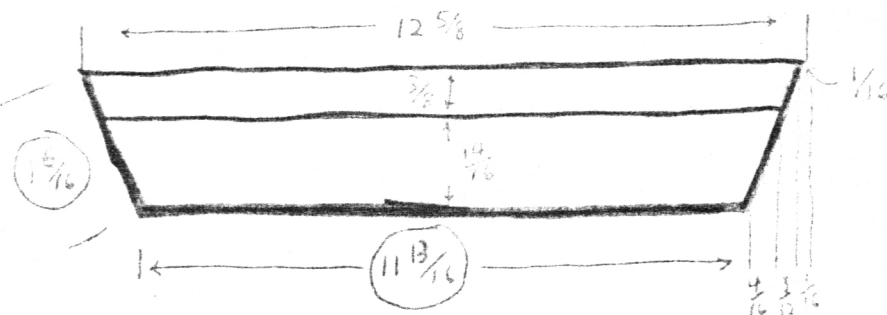
The EP44 has a switch to place it in terminal mode. Then, you may set up the communication parameters as follows: BAUD 300, BIT 7, PARITY E, CODE T/W, ER N. BE SURE YOUR TNC HAS AUTOLF OFF and XFLOW ON and only use a 3 wire RS-232 interface cable. If you use more of the handshaking signals, it won't work right. Once you have set the EP-44 parameters, it will remember them just like the TNC-2. There is no software involved, just turn them both on and operate. There is enough room in the tray for a set of "C" size nicads to power the TNC for truly portable operation.



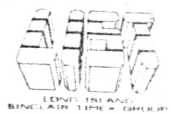
10 $\frac{1}{4}$ SIDE



FRONT



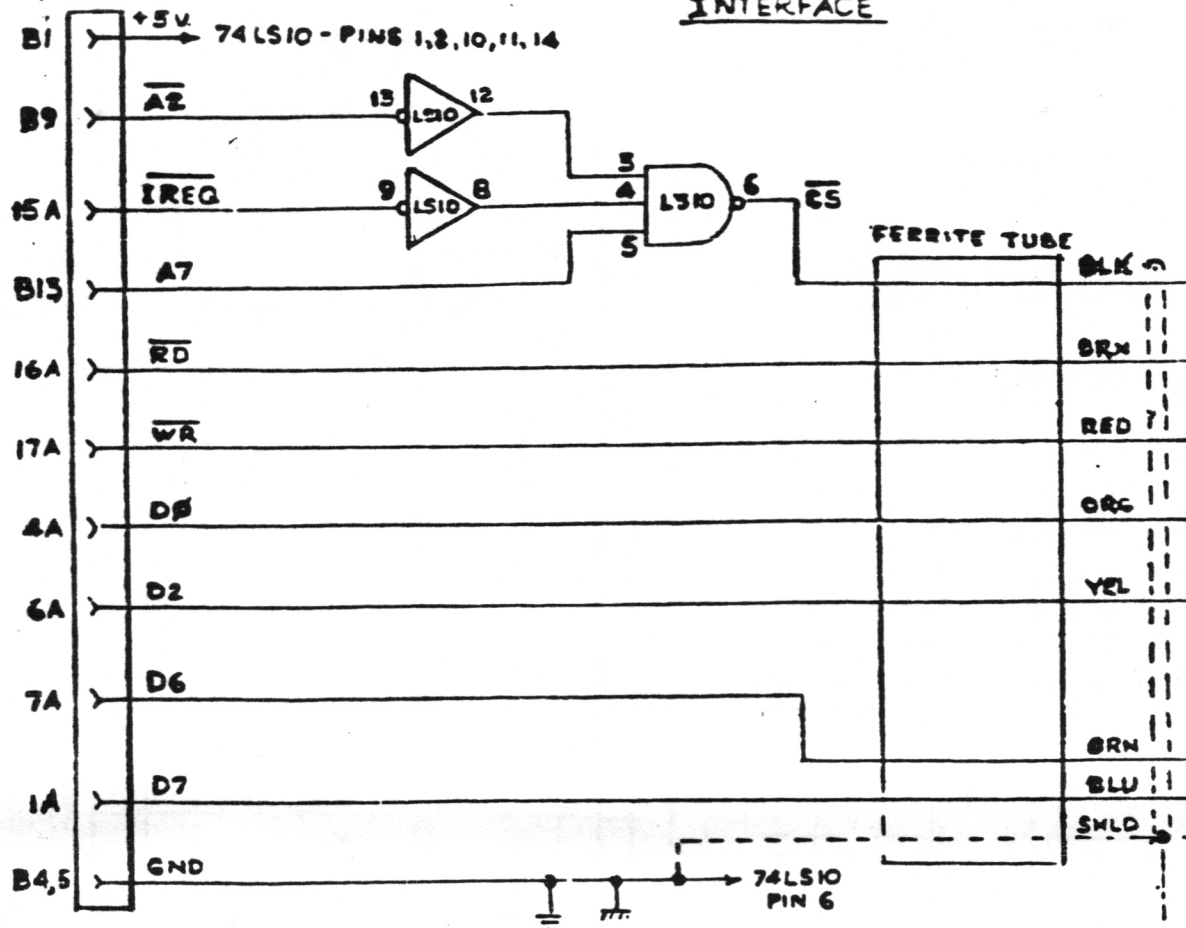
WB4 APR
EP-44 / TAPR-2
BASEPLATE
MOUNTING TRAY



T/S 2040 PRINTER SCHEMATIC

T/S 1500
EDGE
CONNECTOR

INTERFACE



WALL SOCKET
TRANSFORMER

120V AC 35W
TO
24V 1.2A

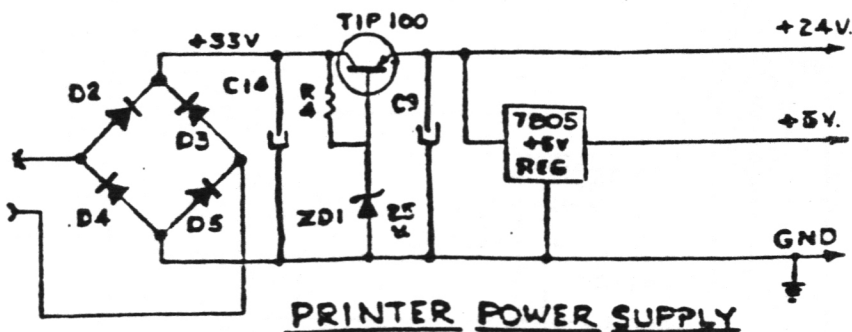
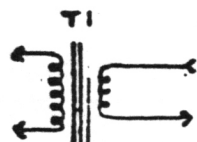


FIGURE 10-5 T/S 2040 PRINTER

04109 ZS TRACED BY JIM L. L.

8405000

BY DOG ORAFELT

The TS 2040 printer, manufactured by Alphacom, prints 32 characters per line on special heat sensitive paper at a horizontal density of 10 cpi and a vertical density of 8.25 cpi and a speed of 2 character lines per second. Each character is formed by an 8 by 8 dot-matrix. The 32 character line is printed as 8 consecutive bit lines of 8x32 = 256 bits per line. The bits are transmitted in serial form through data line D7. Special electronics distribute the signal according to an internal timing to the proper one of 8x32 = 256 print heads. After a bit line is printed, a motor advances the paper by one bit. (1/66.2)

The port selection circuitry consisting of an SN74LS10 is contained in the connector which is basically a feedthrough type with the female side connected to the computer and the male side for additional interfacing.

The address lines A2 and A7 and the IORQ-line are tapped. They go to the selector which gives a signal to the printer when A7 is high and A2 and IORQ are low. In addition data lines D0, D2, D6, D7 and signal lines WR and RD are tapped. These 6 lines and the selection line are brought to the printer in a shielded cable.

The power for the selector chip, contained in the connector is provided by the computer. By selecting a chip of the LS-line the printer obtains its operating voltage. The power supply is provided by an internal 0.25 ampere, 0.13 ampere and in printing mode about 0.21 ampere. An internal rectifier provides the power for the electronic circuitry.

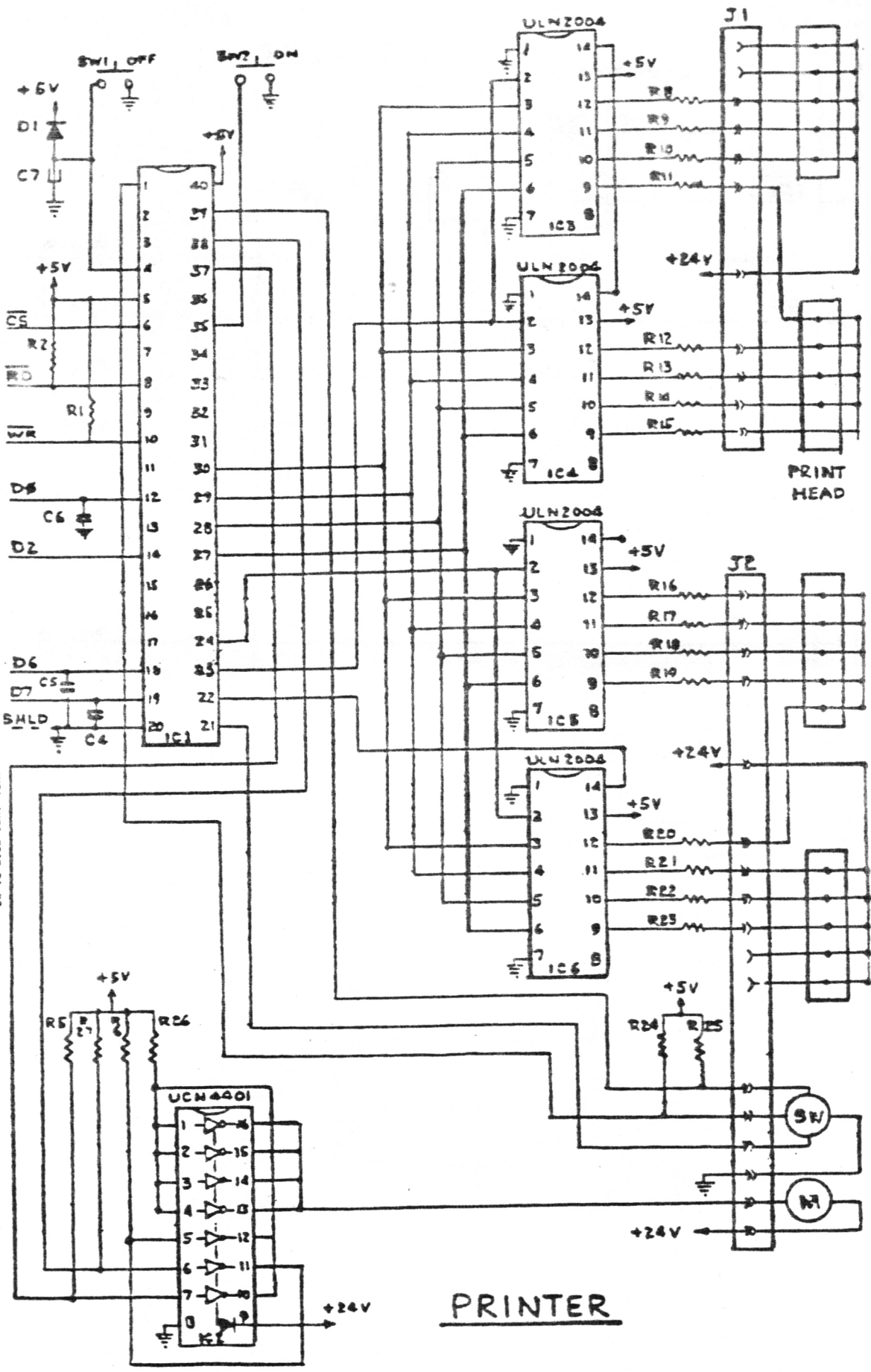
When the printer is not connected, all 8 data lines are high. (FF). Upon connection D7 is pulled low. (7F). When the power comes on D2 and D6 are also pulled low. (3B). (This connection of D2 in the Read-mode is not shown in the TIMEX 2040 Technical Manual). As long as the printer is busy printing a bit D0 is also low. (3A).

After the whole bit line is printed, D0, D2, D6 are pulled low. (BA)

To start printing, an output command OUF (FBI), A with D2 low (i.e. A=00) has to get the motor ready. Each time a bit is to be transferred, an IN A (FBI) command has to test D0. When it is low, the next bit can be transmitted through D7 by OUF (FBI), A, where A is either 00 or 80H according to whether the required printing is to be printed. The motor has to be stopped by outputting 04 to port FB. If this is not done, an additional dot line is printed, as indicated in the TIMEX 2040 Technical Manual for D1 could be detected.

It is essential, to disable the interrupt during the print process since otherwise the always present display interrupts will disturb the print flow, provided by the internal timing.

Min. 2.5 sec.



PRINTER

If you use the Portuguese Disk System and like myself are a "Dyed-in-the-wool" experimenter, constantly changing your disk's contents,.... then this START program was designed for you! Of course any user can benefit from its time saving, error-proof loading technique.

START catalogues any disk and "instantly" assigns a hex number to each program line. A single key press will load any legal program and will automatically GO TO and list any DiRectory. All this in less than 1K memory. START is self-loading after the interface reset button is hit.

One of the problems using the CAT* command is the automatic scroll function. There are two ways to curtail the length of the directory and still use all the programs and memory you may wish to use.

I keep my program LENGTH <=14 lines (less lines=faster access)

1 As in the original Demo disc use (.DIR)directories. The START program will automatically GOTO a .DIR section, list it and then load by directory number.

2 Make the "non-accessable" lines, ie) DATA, SCREEN# etc. invisible. This is done using the command, ATTR#(Pathname)"i. There is no need to worry...the file is still there for your programs' use but one line less on the CAT menu.

If you ever have to access these data sections to erase them or to change them use ATTR#(Pathname)+."v. This will make ALL the lines visable again.

NOW FOR SOME NOTES ON START:

Use the short loader program to set-up the M/C line. After the program stops, keep line 1 only. Then key in the main program.

Placing lines 3&4 into REM saves time. Add line 3 CLS: POKE "VAL 23658".

The small 12 byte machine code line 1, is a modified screen dump from the 5/85 Syncware routine by Robert Hartung. This loads the 6912 screen bytes and stores them at address 30000D. The routine reads the CAT list. Line 30 pokes new values into the MC rapidly moving the screen to the right 2 spaces. Lines 40-45 print numbers 1-14.

If you have any problems or comments about START give me a call at 718 5441106 or write to George Gilder, 57-38 108th St., Forest Hills, N.Y. 11375

```
1 REM XXXXXXXXXXXXXXXX
10 FOR f=26715 TO 26726
20 READ X: POKE f,X: NEXT f
30 DATA 1,48,24,17,48,117,33,0
,64,237,176,201
```

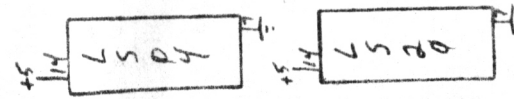
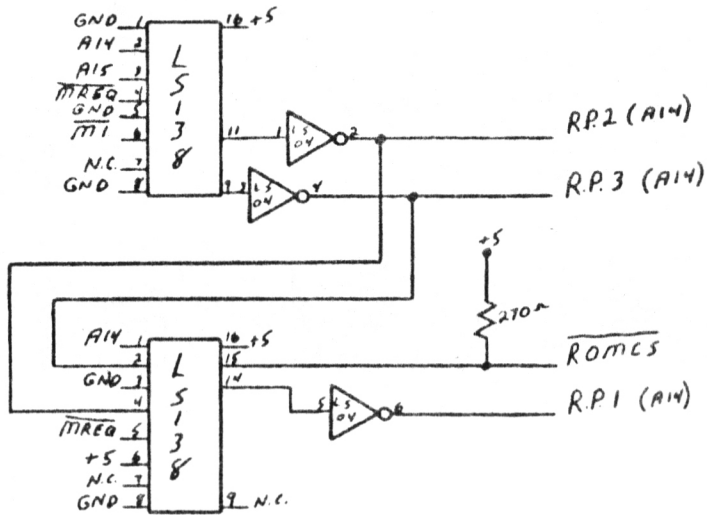
```
1 REM ?0?@!00 GO SUB VAL (>)
2 LET G=VAL "5": LET K=PI/PI:
LET L=K+K: LET J=K-K: LET S=VAL
"14": LET M=S/L: DIM Y$(S): LET
T=VAL "10": LET D=S-K: LET Y=VA
L "48": LET Z=Y+K+K: POKE VAL "2
3658",T-K-K:
3 CLS: LET A$="*****
*****": PRINT INK
L,"A$":* START PROGRAM WITH A
UTO-LOAD ** ©1986 GEORGE GIL
DER *"A$
4 PRINT INK K:"This progra
m is © protected. I give permis
sion for this program to be used
as public domain provided li
nes 3 & 4 are left intact or a
re used in REM."George Gilder
5/86"
20 PAUSE Y: CLS: CAT *: LET Q
=VAL "26715": POKE Q+S-T,Y: POKE
Q+G,VAL "117": POKE Q+M,J: POKE
Q+M+K,VAL "64"
30 RANDOMIZE USR Q: POKE Q+S-T
,L: POKE Q+G,VAL "64": POKE Q+M,
Y: POKE Q+M+K,VAL "117"
40 CLS: RANDOMIZE USR Q: PRIN
T AT J,J:"
45 FOR F=K TO S: LET G$=CHR$ (
F+Y)
50 IF CODE G$>Z+M THEN LET G$=
CHR$ (F+Z+G)
55 IF SCREEN$ (F+G,K+K)=" " TH
EN GO TO T+T
60 PRINT INK K:AT f+G,J:G$: NE
XT F
100 PRINT #K: INK K+K: FLASH K:
"PRESS CODE NO. TO LOAD PROGRAM"
110 LET N$=INKEY$: IF N$="" THE
N GO TO T+T+T
120 DIM Q$(S): IF CODE N$>Z+M T
HEN LET N$=STR$ (CODE N$-Z-G)
125 FOR F=K TO S: LET Q$(F)=SCR
EEN$ ((VAL N$+G),F): NEXT F
150 IF Q$(T TO )=" DIR " THEN L
ET Q$=Q$( TO T-K)+".DIR": GO TO
+Q$: GO TO S
160 IF Q$(T TO )<>" " THEN
LET Q$=Q$( TO T-K)+". "+Q$(T TO )
: LOAD Q$
170 LET Q$=Q$(K+K TO T-K): LOAD
+Q$
9900 CLEAR: SAVE *"START" LINE
1
```

: DEMO
 Level 0 Drive A

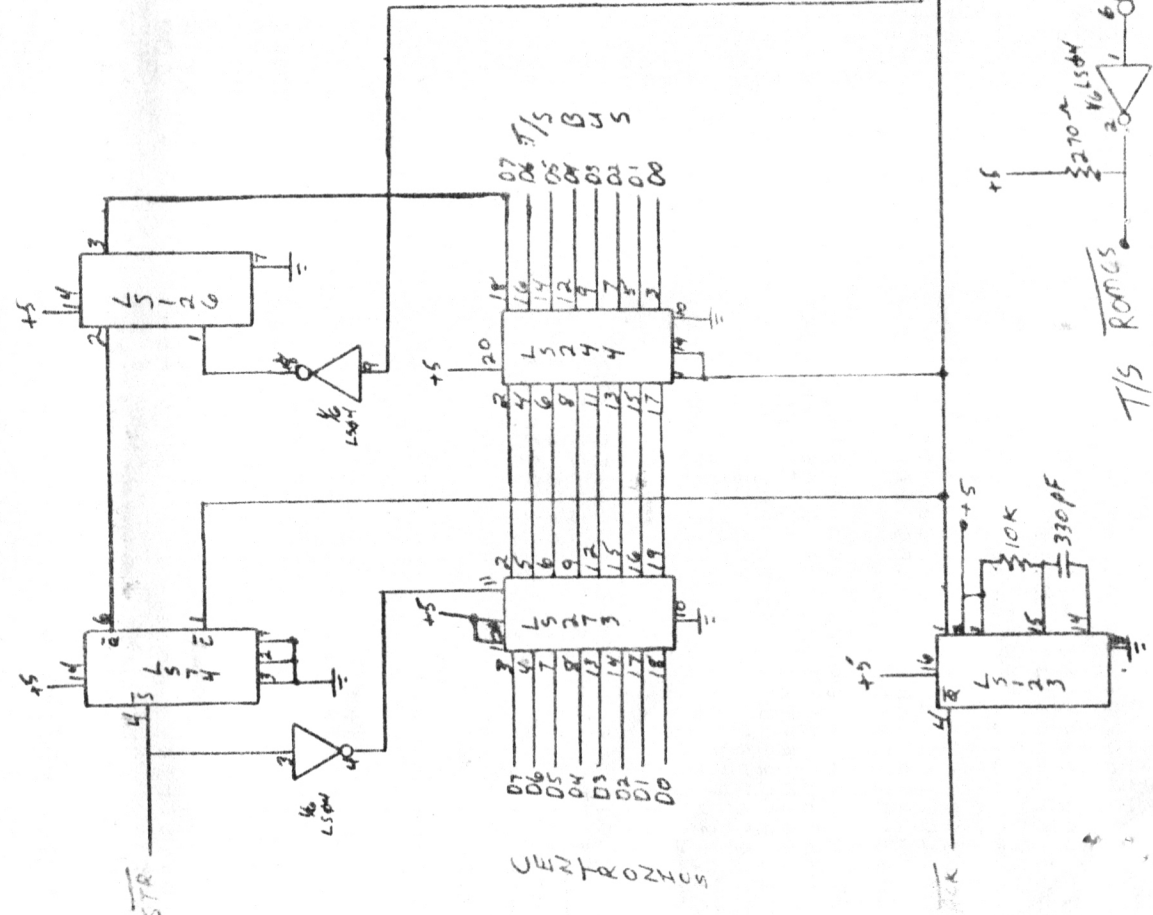
	Name	Typ	Size	Alloc	S	P
1	MATHS	DIR	3187	4K		P
2	FUN	DIR	8919	13K		P
3	UTIL	DIR	4891	11K		P
4	FILING	DIR	1070	2K		P
5	HELP		11491	12K		P
6	GGDIAL	BAS	10265	11K		
7	GGSPK	BAS	14760	15K		P
8	SPKBLD	BAS	7768	8K		P
9	NOSGAM		3730	4K		P
A	START		999	1K		
B	MODEM	DIR	24383	32K		P
C	STARTLET		2619	3K		
D	CASLAB	BAS	2331	3K		
E	PENTSPK		1442	2K		

PRESS CODE NO. TO LOAD PROGRAM

Memory decoding for 3 16K Timer rampacs

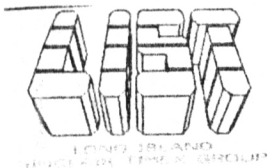


CENTRO TO T/S INAIT RPT
PEEK 14336 = STATUS
255 = READY, 127 = READY
PEEK 12288 = DATA BYTE



The T/S rampacs use address line A14 as an enable. By interrupting and controlling this signal we can control where the rampac will be mapped. This circuit will map three rampacs RP1 @ 16384, RP2 @ 32768, RP3 @ 49152. The top 32K of ram can only be used for variable storage or ram disk. If your basic program pushes the display file into this area your program will be transformed into a graphic's generator. All other lines to the rampacs except A14 remain the same.

D. DAILEY



FOR YOUR INFORMATION

TIDBITS ABOUT CP/M, TS/TC2068, TC2048, ZX81, TS1500, AND QL

BY N.A. PASHTOON

The July issue of Sinclair User has the most momentous news as far as the 2068 users are concerned. It seems that two weeks before the Sinclair sellout to Amstrad, TIMEX Corp. had bagged the complete rights to the Sinclair line of computers in Eastern Europe. Timex(Portugal) has just completed a deal with Poland (see page 1) to sell 800,000 of the 2068 computers, plus 200,000 FDD disk drive systems. The deal is worth \$70M. A similar deal with Czechoslovakia is either in the works or already concluded. The news is heartening that not only is the 2068 alive and well but such large production will probably make the computer the 3rd or 4th computer with the biggest user base. Frankly, though, I am not very much optimistic about much expanded software base for the computer, because of the peculiar attitude toward software in Communist countries. We will keep our fingers crossed and hope. By the way I am grateful to LIST member Andy K. (editor, THE RAMTOP) for sending me the info. See also P.1.

In the pages to follow reference material as well as some other tidbits about our favorite computers is provided.

- 1) CP/M: I have been using the Zebra CP/M system with my 2068 for the last two months. CP/M(Control Program for Microcomputers) is an early (vintage '73) disk operating system with a very large public domain and low cost excellent software base. The Zebra's Portugese CP/M system is basically a low cost upgrade to your existing Zebra Disk Drive System. The system will still run your Timex or Spectrum software. Note that to run Spectrum software you need to equip your 2068 with the Spectrum emulator as well as the interface to the disk drive must be Spectrumized. The CP/M (version 2.2) system comes with its standard suite of system utilities. We will probably publish a review in the future. Presently I am exploring the compatibility of Zebra's CP/M with any U.S. CP/M machines. After some investigation I found out that a 5 1/4" diskette prepared under the Timex CP/M can be read and written to by Televideo TS802/803/806., though the reverse is not true. At the present the only way to run CP/M software would be by serial transfer of files between another CP/M based computer and the Zebra CP/M system.
- 2) More than three months ago I delivered a working and tested prototype for a dual personality module, so that Zebra's disk drives will run both TS2068 and Spectrum software. At the time Zebra issued a bulletin announcing the availability of the product. The present catalog does not mention the product. After talking with Zebra Systems, I was assured that the product will be available in the fall. Note that with the CP/M upgrade and this module you literally have three computers under your finger tips. If you have any inquiries please direct them to Zebra Systems.
- 3) On Page 13 of this issue of LIST John Bell has a circuit for running double-sided disk drives with the Zebra Disk Controller. As can be seen he uses 74LS08 which has a totem pole output stage. If you are in the habit of connecting and disconnecting your cables every ten minutes like me, you can at least burn the chip by installing the cable upside down. The remedy is to use open collector sourced logic with proper pull up resistors. An example is the circuit shown in Fig.1(from a British source)which makes the second side of a double sided disk drive appear as though it was an independent/second drive.

The pin numbers shown are for standard 5 1/4" drive edge connector. Decouple the 7417 close to the power supply pin. Connect unused inputs through a 1k pullup resistor to the +5V supply.

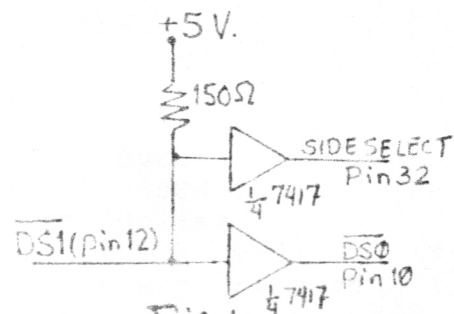


Fig. 1

- 4) While on the subject of 5 1/4" disk drives, members of LIST have operated successfully the following drives with their Zebra controller. Both Bob G. and John B. are using the Remex drives which were advertised for \$39.95. I have used for many months two TEAC FD54 drives without any problems. Please note that the drives must be separately powered. The rule of thumb is that any 40 track 5 1/4" drive with a Shugart standard edge connector and a maximum access time of 6 milliseconds would work with the Zebra Controller.

- 5) ROM-BASED EMULATION: In the June issue of LIST Paul Donnelly had mentioned a problem users were having with a new batch of NEC ROMs when used with Wes B.'s ROM emulation circuit. (see also earlier issues of LIST). To cure the problem just swap the connections to pin 20 and pin 27 of the ROM chip. With this connection both the NEC as well as the AMD ROM chips will work. For those of you who had fully populated the Zebra interface board (twistor and emulator+RGB), or are planning doing so in the future there is no need to worry. The circuit which was developed Dec. '84 (reported in Feb. '85 LIST) does work with any Spectrum ROM.

- 6) ZX81 MEMORY EXPANSION: For those of you who have equipped your ZX81 with 64K or more memory and are bugged by the display file jumping all over the place the nifty circuit to the right (Fig. 2) will totally free up the 32K to 48K area for any of your machine code routines. Note that one trace to the ULA is broken so that the 1K resistor can be installed. The source of the tip is Swedish.

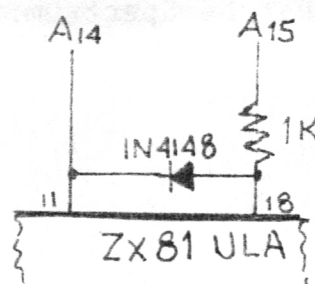


Fig. 2

- 7) 2050 MODEM CIRCUIT: In the Feb. '86 LIST the major portion of the 2050 modem circuit was published. At the time we did not have the relay portion of the circuit. In Fig. 3 the remainder of the modem circuit is provided.

- 8) TS2068 Circuit Diagram: Working with the TS2068 for the last three years and from time to time tracing the circuit board while repairing, I encountered errors on the schematic provided in the technical manual. In Fig. 4 an updated schematic is presented in which a total of 17 errors were corrected. I cannot confirm the assertion in a recent issue of THE RAMTOP that the W1 and W2 links are the reverse of what they are indicated on the schematic.

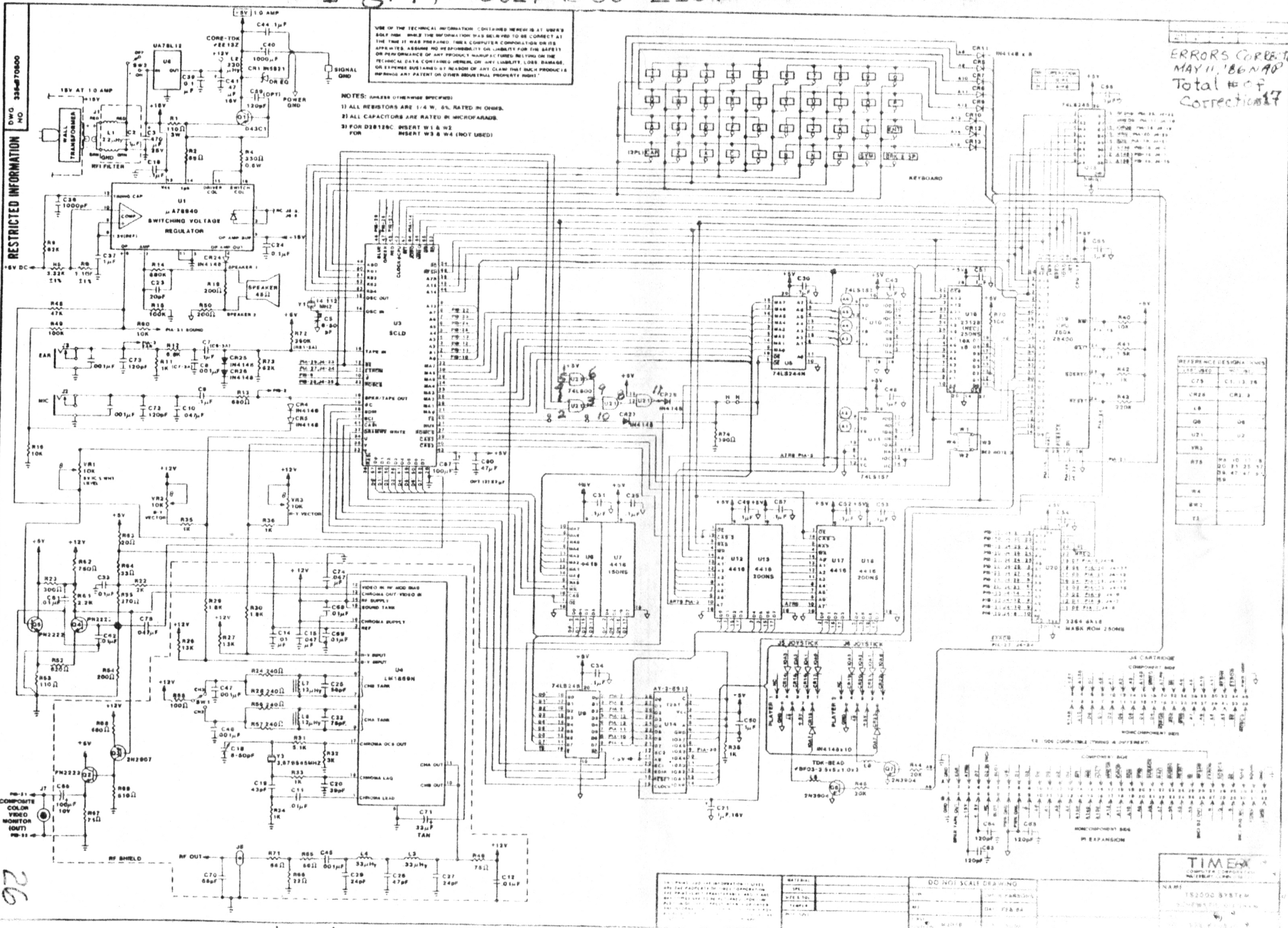
- 9) TS2068 SCLD and TC2068/2048 PAL PINOUTS: Recently another user group as a service to the TIMEX community ordered the SCLD chips from Portugal. Portugal mistakenly send them the TC series PALs. Since we might be seeing more of these (via Mexico or Canada) I decided to dust off my notes of the TC2068 review (May-June '85 LIST), and complete the tracing of the machine. In Fig. 5 the pinout of both the TS-SCLD and the TC-PAL are super-imposed. As you can see they are not the same. The 68 pin chips are in PLCC package with the outline conforming to the variation AE of JEDEC registered outline MO-047. Sockets for the chips are manufactured by ITT (#LCS-68-03SMT), AMP (#6401345-1 or 2),

Fig. 4, JULY 1986 LIST

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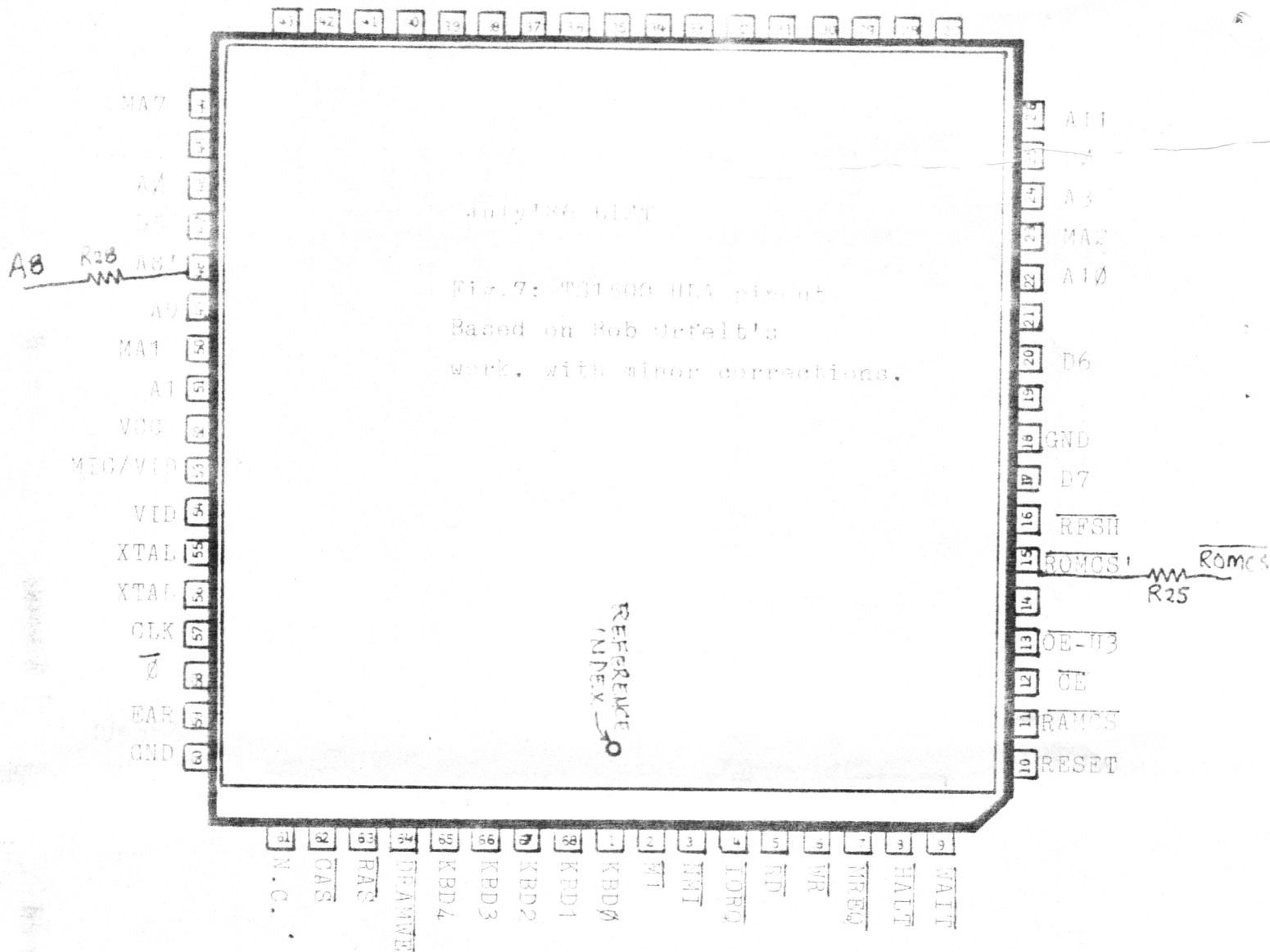
- NOTES: (UNLESS OTHERWISE SPECIFIED)
- 1) ALL RESISTORS ARE 1/4 W, 5% RATED IN OHMS.
 - 2) ALL CAPACITORS ARE RATED IN MICROFARADS.
 - 3) FOR D2818C, INSERT W1 & W2, INSERT W3 & W4 (NOT USED) FOR



ERRORS CORRECTED
MAY 11, '86 N90
Total # of
Corrections 17

REF. DESIG.	QTY.	UNIT
C1	1	10K
C2	1	10K
C3	1	10K
C4	1	10K
C5	1	10K
C6	1	10K
C7	1	10K
C8	1	10K
C9	1	10K
C10	1	10K
C11	1	10K
C12	1	10K
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C14	1	10K
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C95	1	10K
C96	1	10K
C97	1	10K
C98	1	10K
C99	1	10K
C100	1	10K

TIME-A
152000 SYSTEM
N90
152000 SYSTEM
N90



(Cont'd from p.24)

METHOD(#213-068-002). I have made timing measurements on the two chips. From a timing point of view it is not possible to distinguish the two chips. One pleasant surprise with the PAL chip was that it provides RGBI, so you can display 16 colors with RGB monitors. This necessitated updating the TC2068 expansion bus connector. The update is shown in Fig.6.

10) TS1500 ULA: Recently I purchased the TS1500 schematic diagram from SUNSET ELECTRONICS. The schematic was prepared by Bob Orfelt, a Timex enthusiast and developer. The pin numbering of the ULA was in error. In Fig.7 the TS1500 ULA is shown with corrected pin numbers. Further I took the liberty of renaming some pins to make it correspond to the standard TIMEX nomenclature (Sorry about that Bob!). If you need the complete diagram order it from SUNSET ELECTRONICS.

11) QL MEMORY EXPANSIONS: Fig.8 and Fig.9 show memory expansions for the QL. In Fig.8 memory expansion to 64K or 128K is shown using the 4164 chips. Fig.9 shows the memory expansion to 256K using the 41256 chips. Both circuits utilize the TI TMS4500 memory controller. I saw the TMS4500 in a recent flyer from JAMECO for \$19.95. (Source: British)

12) PUZZLE: Photo 1 and photo 2 show a mystery computer, actual size. I am going to be nasty and leave you guessing about which computer it is. Just a word of advice: If you encounter this computer any where, and have spare cash with you BUY IT!!!! Guaranteed you will be very pleasantly surprised.

(Cont'd on P.30)

Note that the each memory chip and the TMS4500 has to be bypassed by 0.1 μ F ceramic capacitors. Use 150 nSec. access time or faster memory chips.

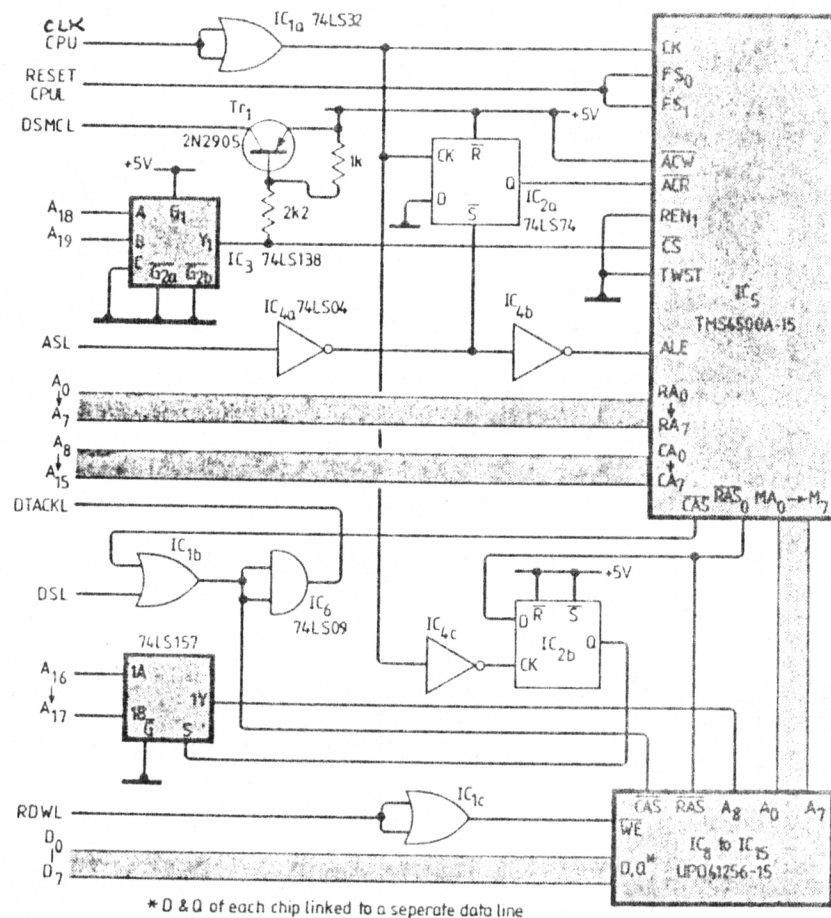


Fig.9: QL memory expansion to 256K. Bypass the memory chips and the TMS4500 to GND by 0.1 μ F ceramic caps. Q1's bus pinout shown on Fig.8.

(Cont'd from page 28)

- 13) After reading the ads. in British magazines, if you had wondered where can you get the low cost Babani series of paperback books, the answer is right here on the Island. The books are supplied by

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Their catalog lists hundreds of titles in electronics. Titles of interest to us are:

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The S&H is \$1.00. Local orders add the local sales tax. They respond fast.

- 14) A curious note about our computers appeared in an important trade journal (Electronic Design News), which I am reproducing in its entirety below. You are supposed to guess the month of publication. Have a nice summer.

N. Pashtoon, Port Jefferson, NY

IBM DISCONTINUES TIMEX/SINCLAIR LOOKALIKE

Industry watchers, listeners, and smellers were stunned last week at IBM's announced withdrawal from the Timex/Sinclair-clone market. Manufacturing of the PCtot by subcontractor Joe's Garage (Sleazonia, WV) will cease by the end of April. According to IBM, however, the cessation of production does not mean the company is abandoning the PCtot. A spokesman said, "We'll continue to market the machine; we're confident that customer demand will remain strong for the dozens of unsold machines in inventory. As for the six people who have already bought PCtots, let me reassure them they'll continue to receive full support from Joe in West Virginia." IBM's

PUZZLE: Is this Microdigital TK90X (Brazilian), or an Investronica (Spanish) computer, or one of Cedric B.'s creations?

Answer: None of the above. So what is it?

Joystick Port, as reflected in a mirror.

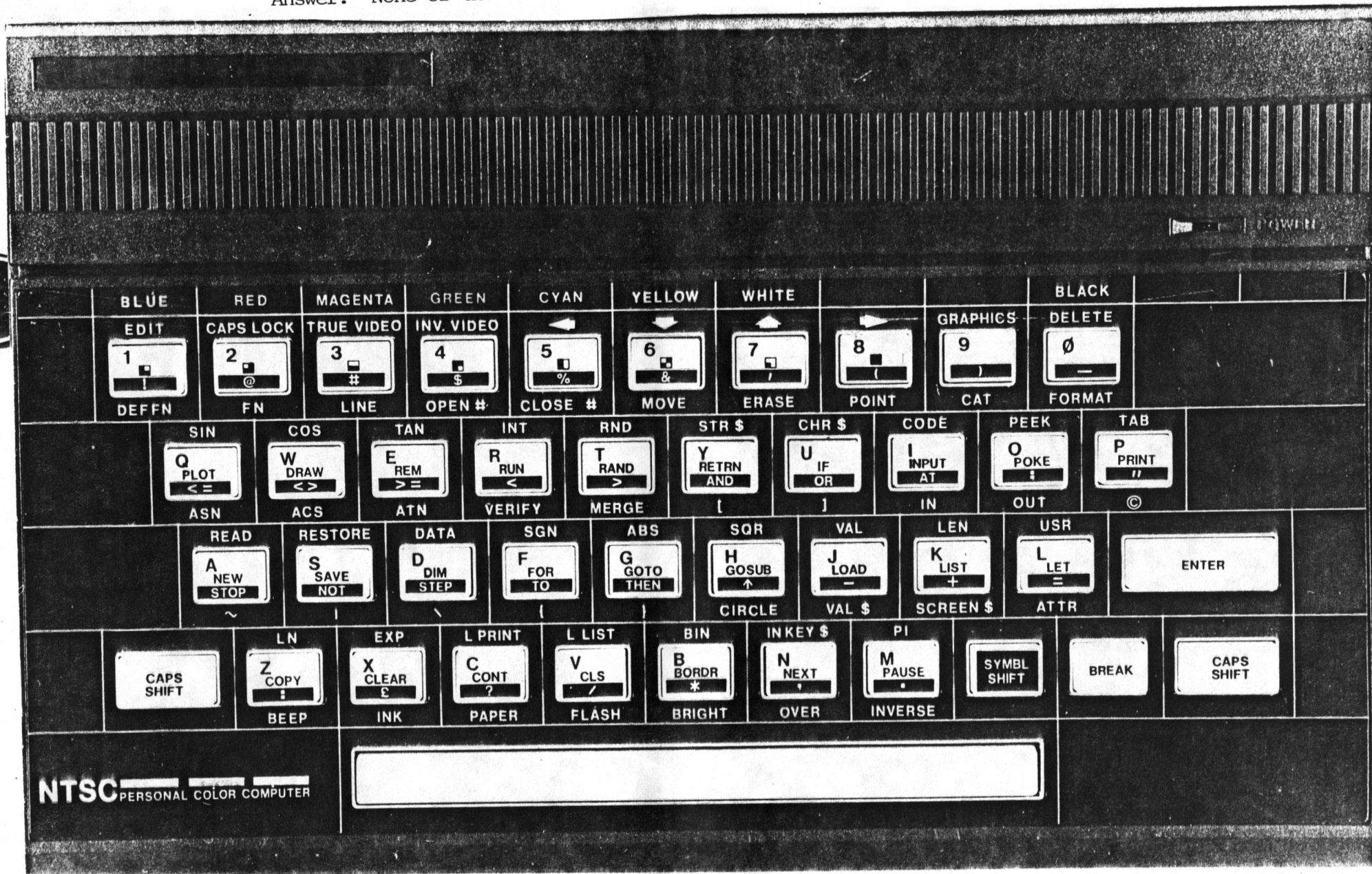


Photo 1. Actual Size.

COMPUTER DICTIONARY

The number of new words spewed out by Timex-Sinclair related publication has become too much for our wordologist. In future, we'll just be listing the words we find and the publication in which they appeared (Editors of newsletters, please note). We're asking our membership who subscribe to the other publications to review the entry and tell us what they think it means.

The member who supplies the greatest number or highest quality submission will receive the accolade of his peers and absolutely nothing else as a special PRIZE.

- TROUBLESHOOT A hunt for avian/insects in your computer.
Troubles are a cross between turkeys and tribbles.
- NERVE RACKING Putting your nerves on a shelf while you try to load a new program.

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TS Source Guidebook
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Reports
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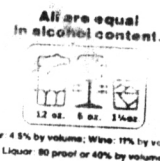
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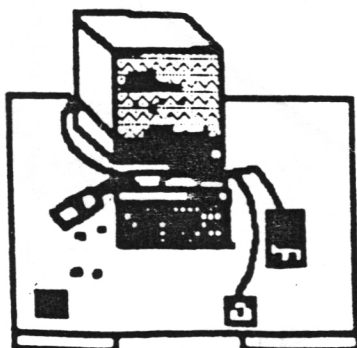
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at 2:PM

L.I.E. or N.S.P. to Rt 110 N.
Follow 110 across RT 25 to RT 25A
Go left on 25A. Library is 4 blocks
down on the left.